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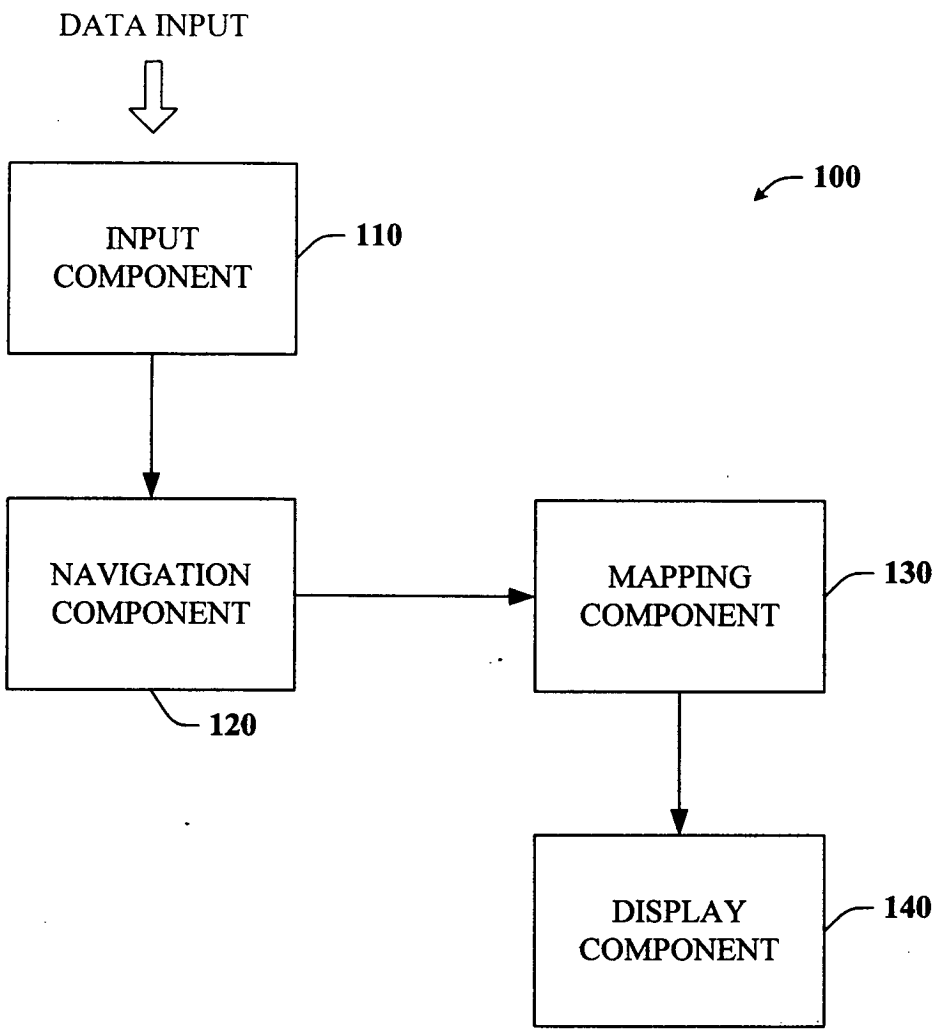

DATA INPUT
100
INPUT COMPONENT
110
NAVIGATION COMPONENT
120
MAPPING COMPONENT
130
DISPLAY COMPONENT
140

FIG. 1

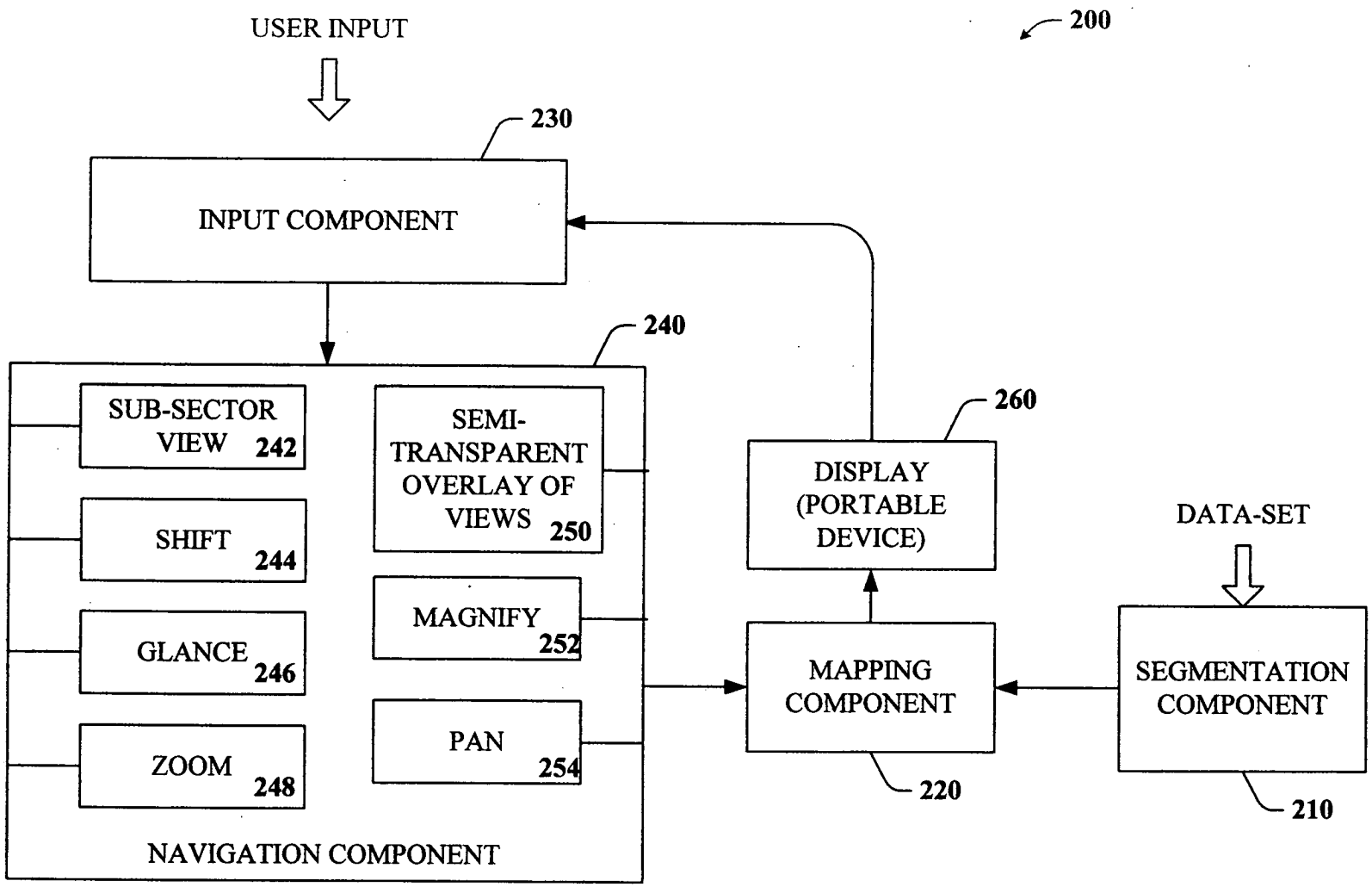
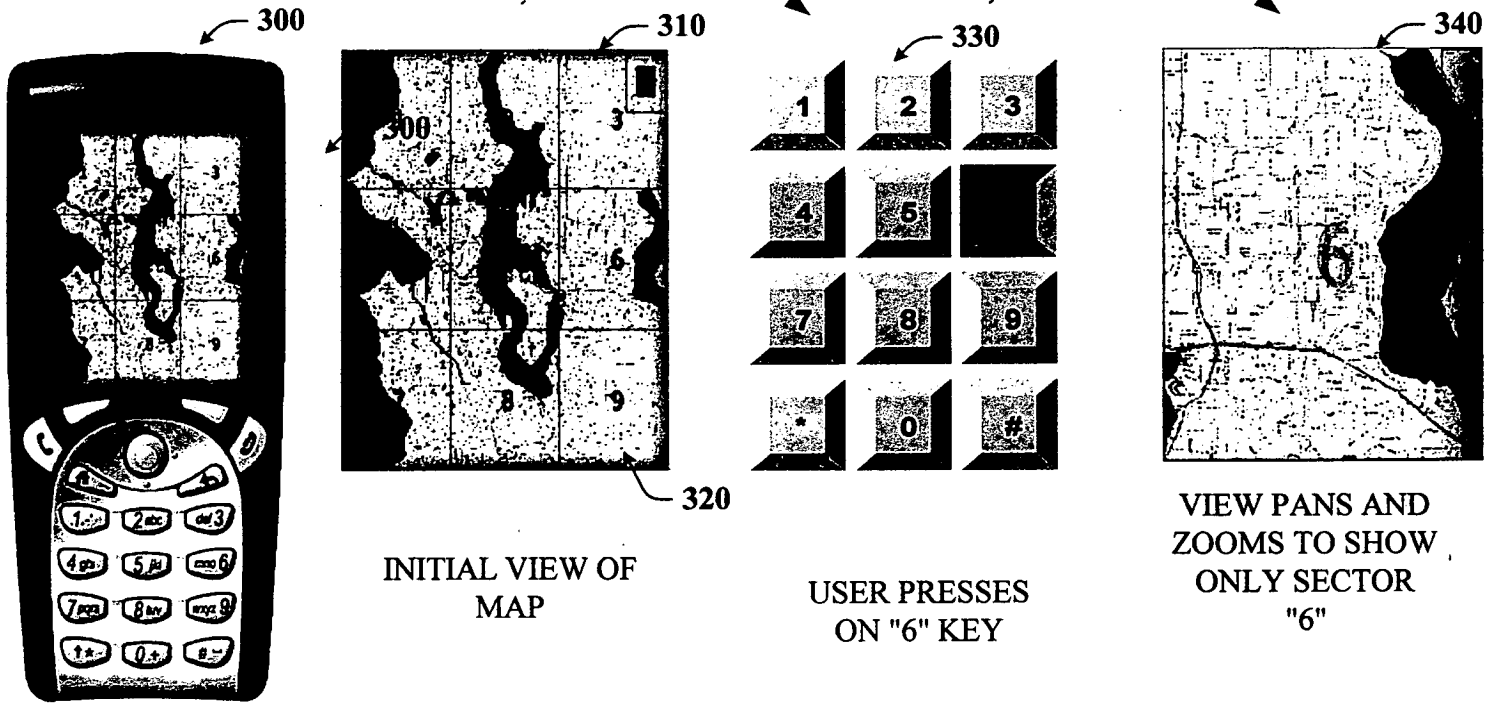

USER INPUT
200
230
INPUT COMPONENT
240
SUB-SECTOR VIEW 242
SHIFT 244
GLANCE 246
ZOOM 248
SEMI-TRANSPARENT OVERLAY OF VIEWS 250
MAGNIFY 252
PAN 254
NAVIGATION COMPONENT
260
DISPLAY (PORTABLE DEVICE)
MAPPING COMPONENT
220
DATA-SET
SEGMENTATION COMPONENT
210

FIG. 2



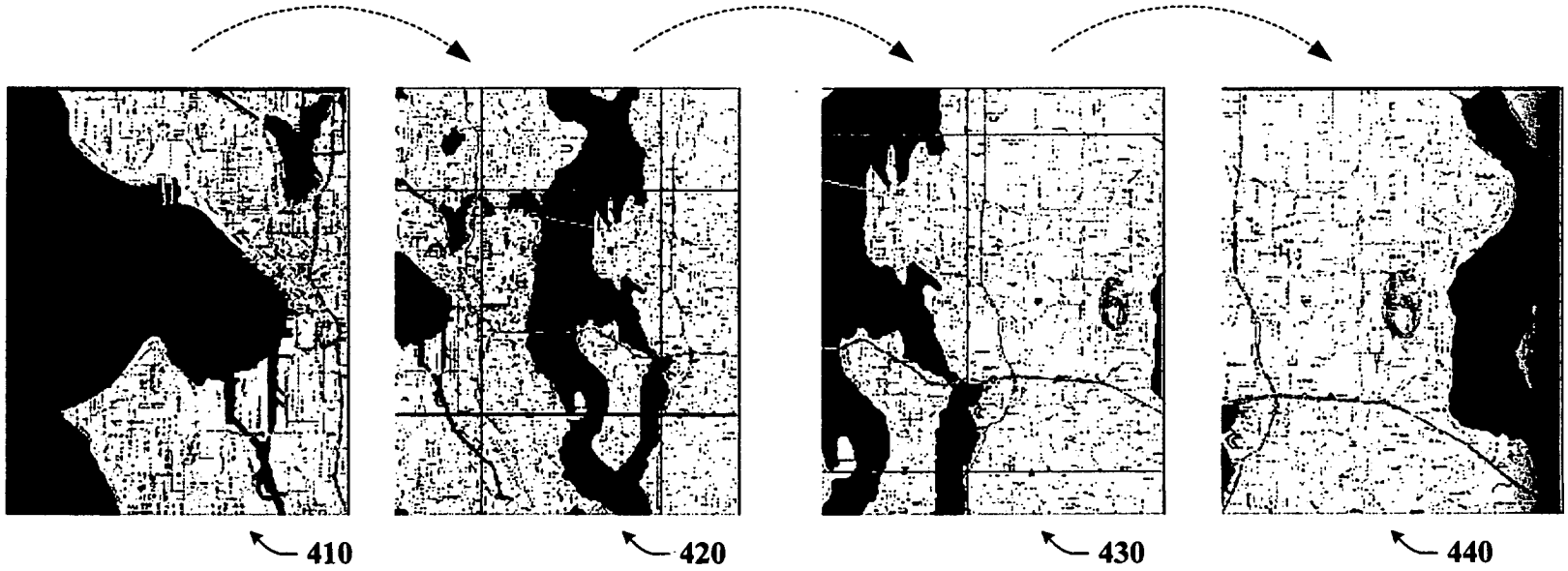
EXEMPLARY PORTABLE DEVICE WITH KEYPAD - USING SUBJECT NAVIGATION SYSTEM

INITIAL VIEW OF MAP

USER PRESSES ON "6" KEY

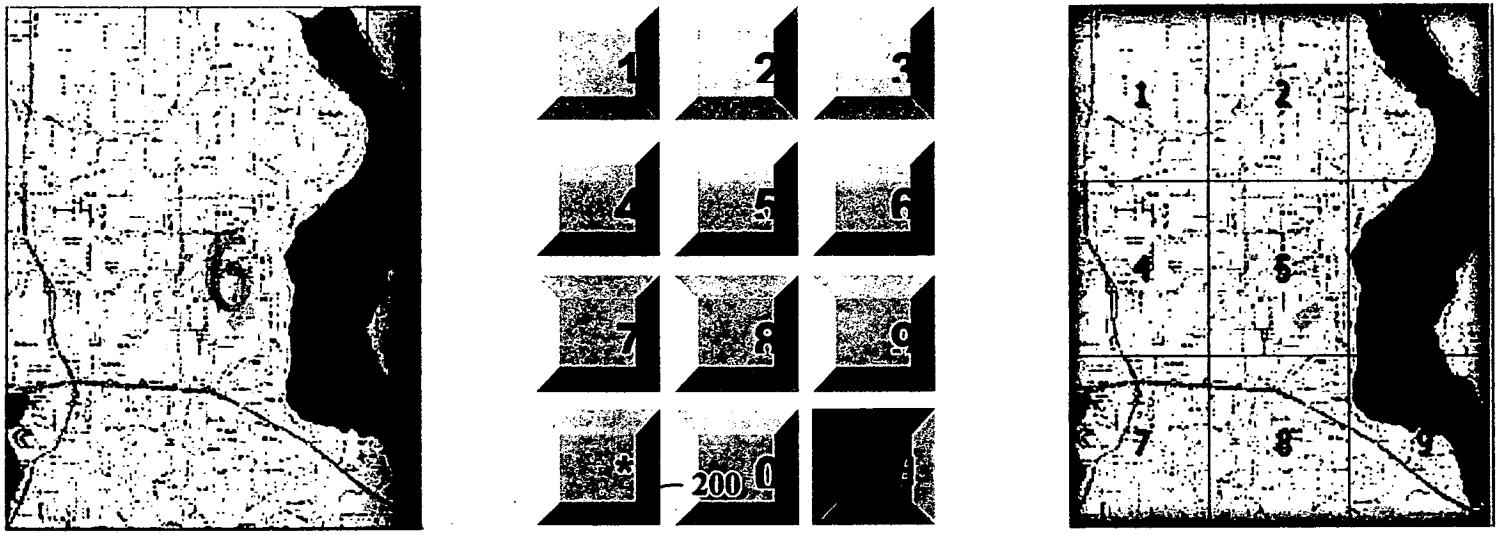
VIEW PANS AND ZOOMS TO SHOW ONLY SECTOR "6"

FIG. 3



VIEW ZOOMS OUT DURING PAN FROM ONE SIBLING VIEW (SECTOR 4) TO ANOTHER (SECTOR 6)

FIG. 4



VIEWER IS ZOOMED IN TO SECTOR "6" 510

USER PRESSES ON "#" KEY 520

CURRENT VIEW IS SEGMENTED TO VIEW AVAILABLE SECTORS 530

FIG. 5

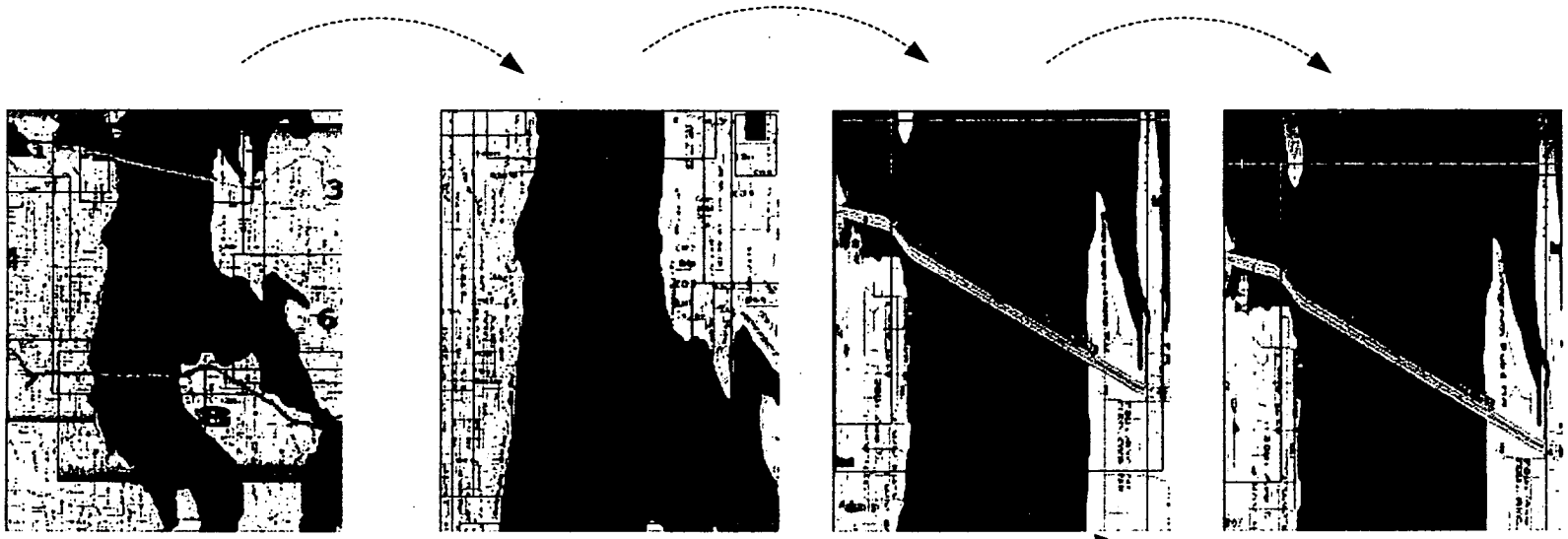

600
610
620
630
THE CURRENT VIEW IS DIVIDED INTO SECTORS THAT ARE OPTIMIZED
DURING THE VIEW ANIMATION, THE MAP SHRINKS AND STRETCHES SO THAT THE ASPECT OF THE SELECTED CHILD VIEW FILLS THE FRAME

FIG. 6

RELATIONSHIP BETWEEN ZOOMED IN VIEW REGIONS, ENTIRE DATA-SET, AND DISPLAY DEVICE

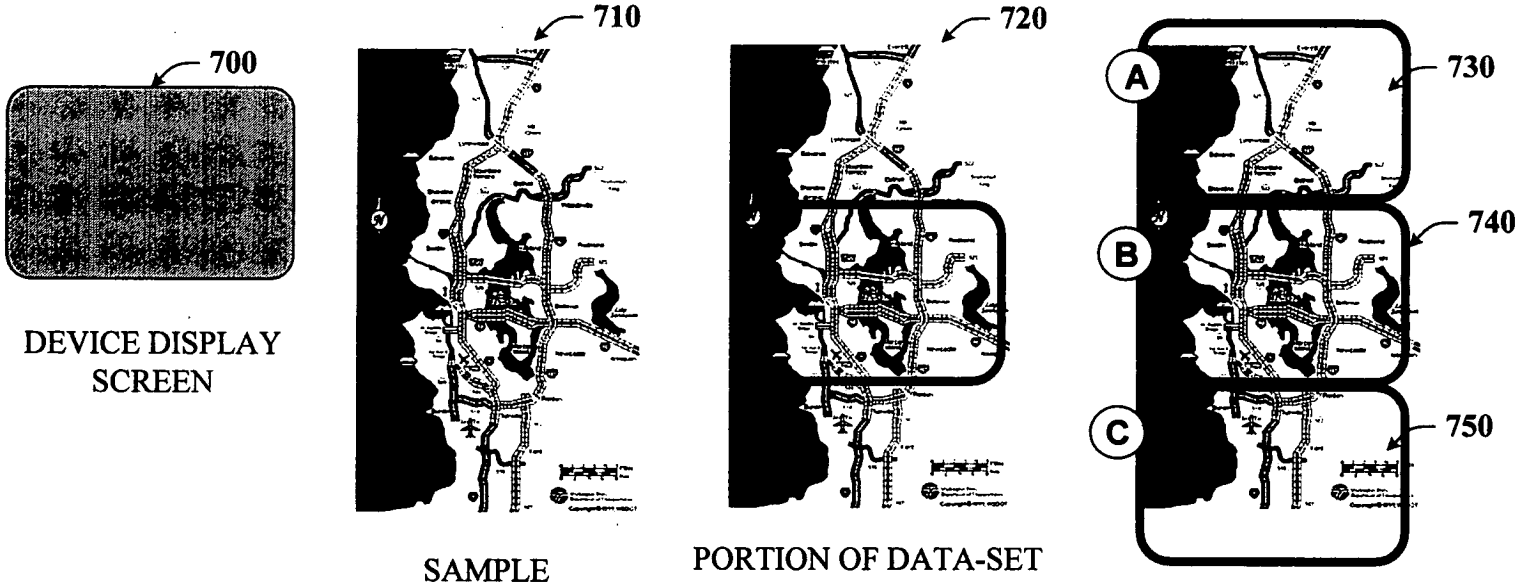
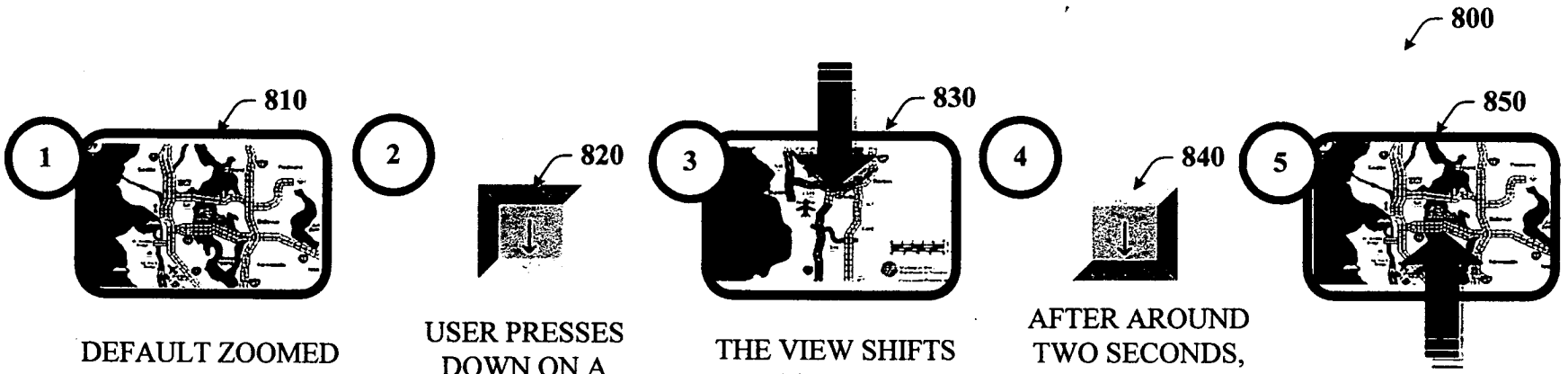


FIG. 7

SEQUENCE OF EVENTS THAT HAPPEN WHEN USER PRESSES-AND-HOLDS A BUTTON THAT IS ASSIGNED TO A PARTICULAR VIEW



DEFAULT ZOOMED IN PORTION OF THE DATA-SET

USER PRESSES DOWN ON A HARDWARE BUTTON THAT CORRESPONDS TO A PREDEFINED VIEW SHIFT

THE VIEW SHIFTS "DOWN" TEMPORARILY

AFTER AROUND TWO SECONDS, THE USER RELEASES THE BUTTON

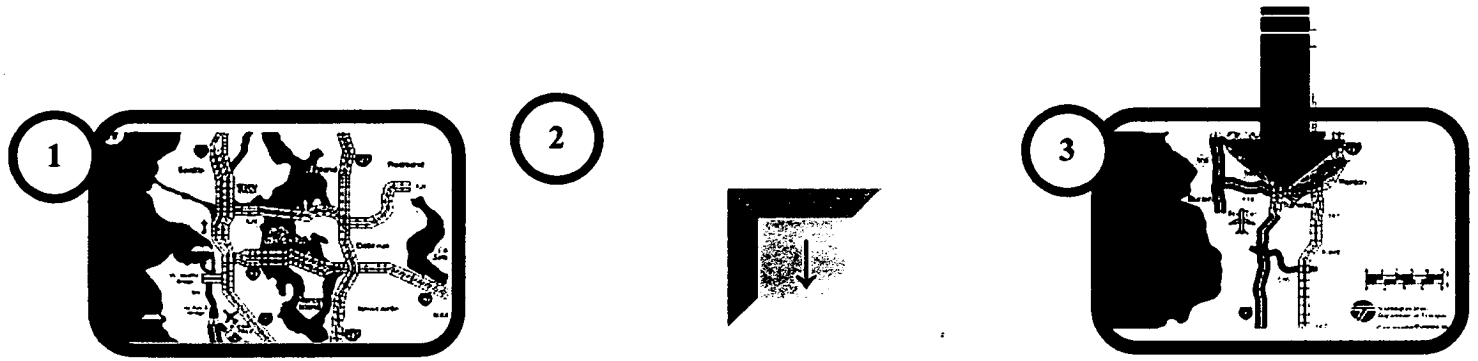
(NOTE: BUTTON CAN BE HELD FOR A TIME SPAN COMMENSURATE OR LONG ENOUGH TO DISTINGUISH BETWEEN A USER TAPPING A BUTTON AND HOLDING-AND-RELEASING A BUTTON)

THE VIEW RETURNS "UP" TO THE ORIGINAL CONFIGURATION

FIG. 8

SEQUENCE OF EVENTS THAT HAPPEN WHEN USER TAPS A BUTTON THAT IS ASSIGNED TO A PARTICULAR VIEW

900



DEFAULT ZOOMED IN PORTION OF THE DATA-SET

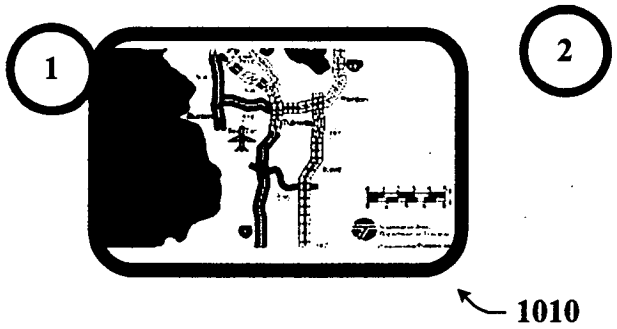
USER TAPS (QUICKLY PRESSES AND RELEASES) A HARDWARE BUTTON THAT CORRESPONDS TO A PRE-DEFINED VIEW

THE VIEW SHIFTS "DOWN" TO THE NEW CONFIGURATION

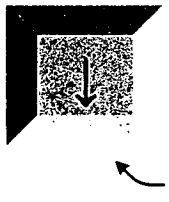
FIG. 9

1000

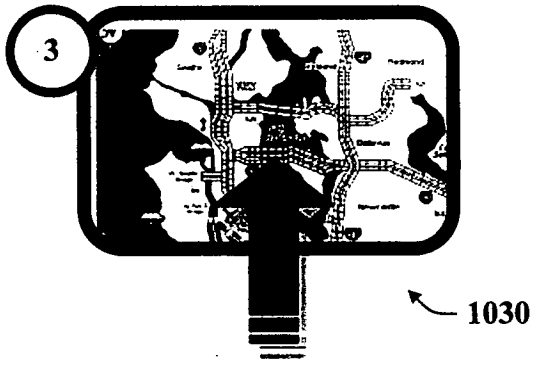
SEQUENCE OF EVENTS THAT HAPPEN WHEN USER TAPS A BUTTON AFTER VIEW HAS ALREADY SHIFTED - TO TOGGLE THE VIEW



THE VIEW IS ALREADY SHIFTED AWAY FROM AN ORIGINAL FOCUS OF INTEREST



USER TAPS (QUICKLY PRESSES AND RELEASES) A HARDWARE BUTTON THAT CORRESPONDS TO A PRE-DEFINED VIEW

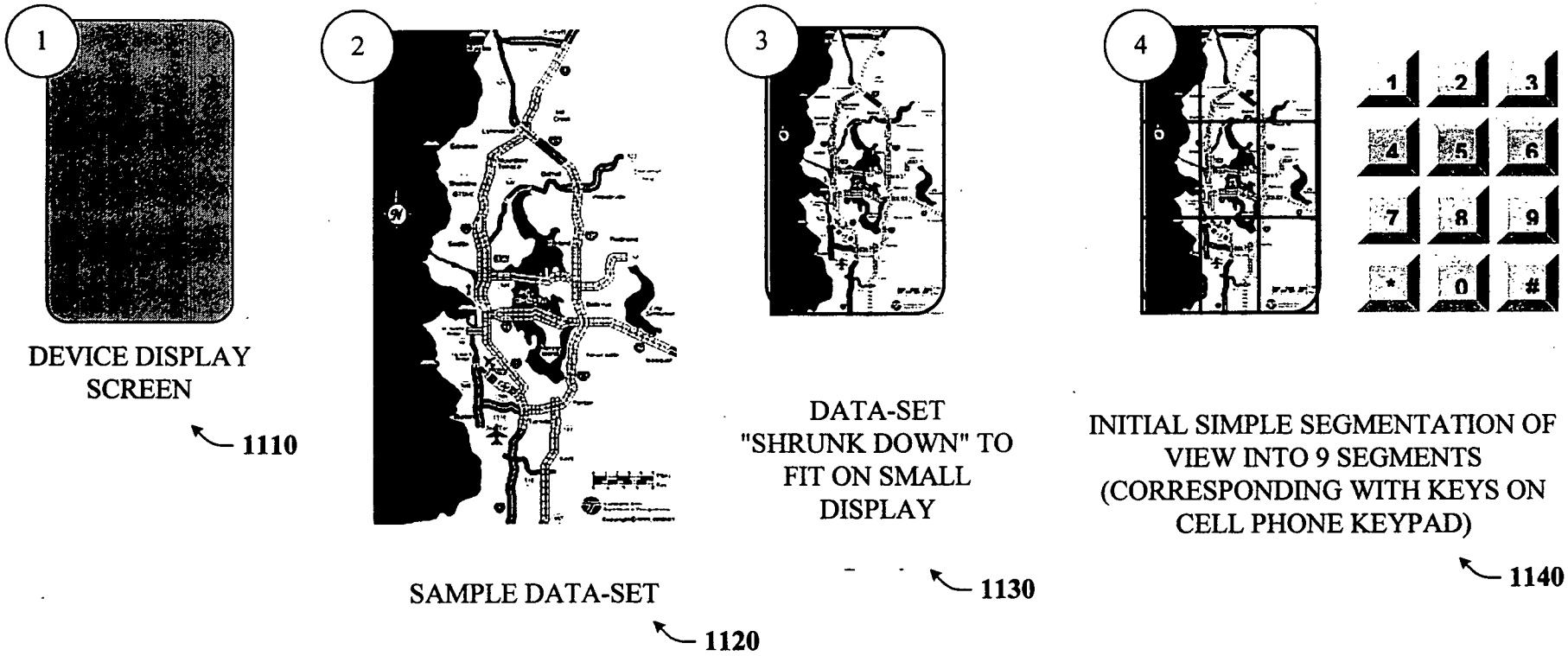


THE VIEW SHIFTS BACK "UP" TO THE ORIGINAL FOCUS OF INTEREST

FIG. 10

1100

SIMPLE SEGMENTATION OF THE MOST ZOOMED OUT VIEW OF A DATA-SET



DEVICE DISPLAY SCREEN

1110

SAMPLE DATA-SET

1120

DATA-SET "SHRUNK DOWN" TO FIT ON SMALL DISPLAY

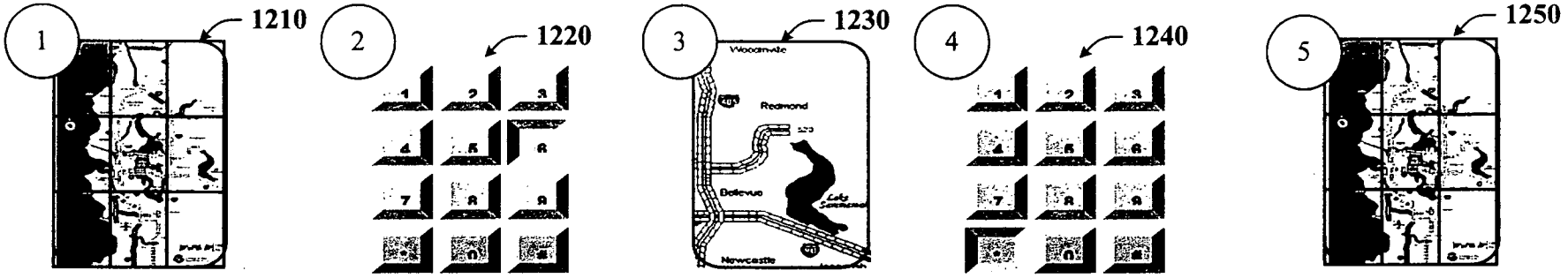
1130

INITIAL SIMPLE SEGMENTATION OF VIEW INTO 9 SEGMENTS (CORRESPONDING WITH KEYS ON CELL PHONE KEYPAD)

1140

FIG. 11

GENERAL INTERACTION FOR NAVIGATION AMONG VIEW-SUB-SEGMENTS AT A GIVEN ZOOM LEVEL



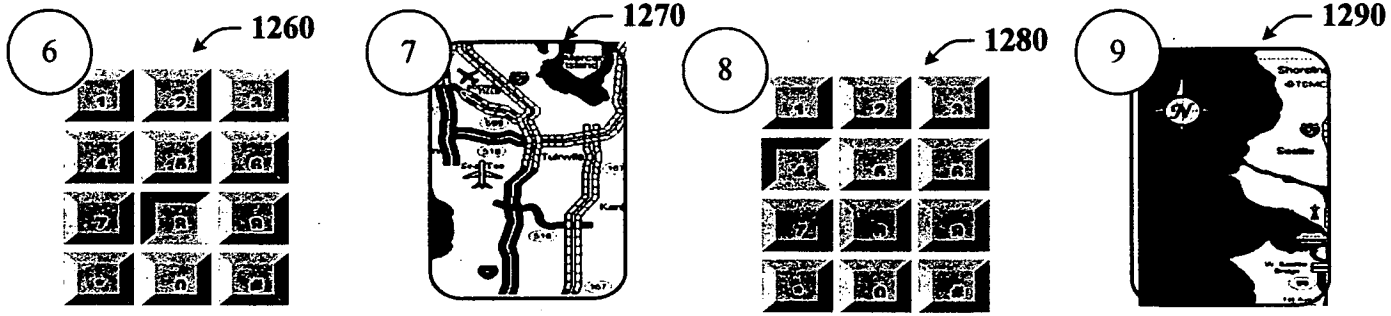
INITIAL SEGMENTATION OF VIEW

USER TAPS ON "6" KEY ON KEYPAD OF PORTABLE DEVICE

VIEW ZOOMS IN TO JUST SHOW VIEW-SUB-SEGMENT THAT CORRESPONDS TO KEY "6"

USER TAPS ON "*" KEY WHICH IS MAPPED TO "ZOOM-OUT"

THE VIEW ZOOMS BACK OUT TO THE INITIAL VIEW



USER TAPS ON "8"

VIEW ZOOMS IN TO JUST SEGMENT "8"

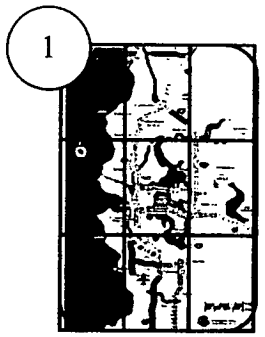
USER TAPS ON "4" KEY

VIEW STAYS AT CURRENT ZOOM LEVEL BUT SHIFTS TO SHOW SEGMENT "4"

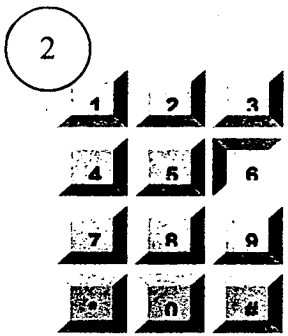
FIG. 12

GENERAL INTERACTION FOR SWITCHING BETWEEN ZOOM LEVELS

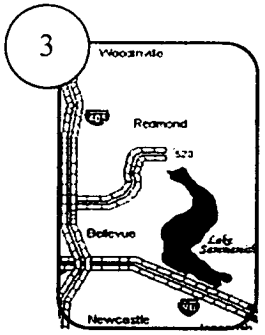
1300



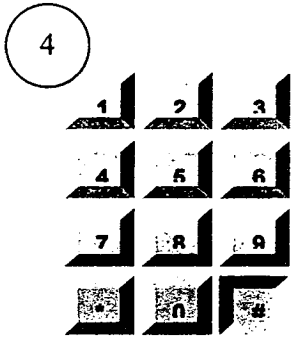
Initial segmentation of view



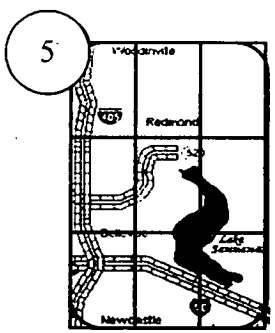
User taps on "6" key



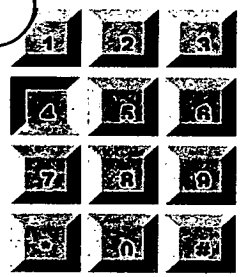
View zooms into segment "6"



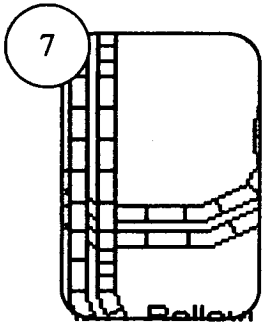
User taps on "#" key which corresponds to "zoom in"



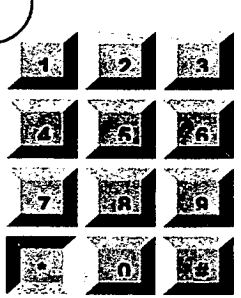
Current view is segmented into 9 sub-segments



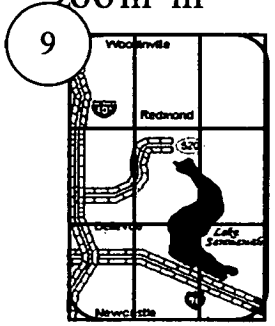
User taps on "4" key



View zooms into new sub-segment "4"



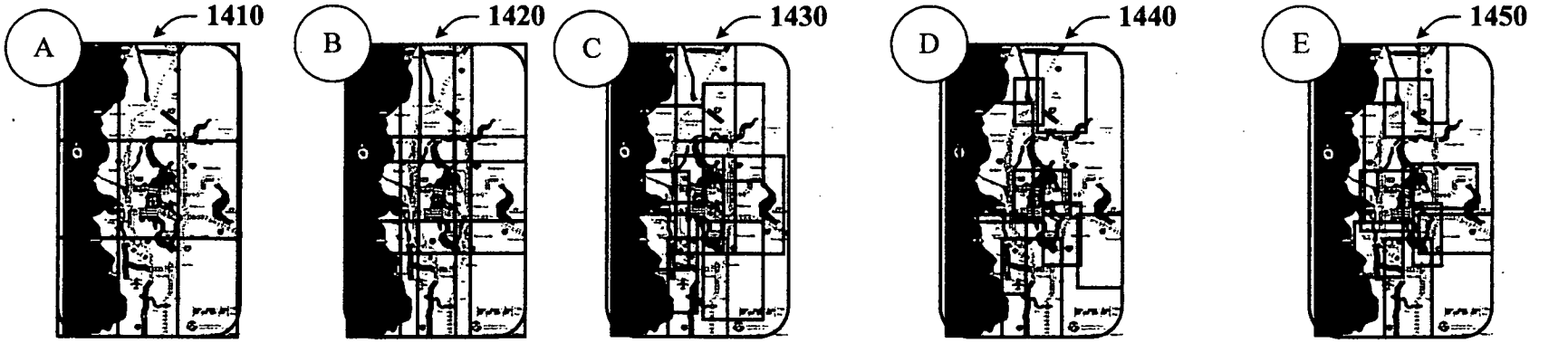
User taps on "*" key which is mapped to "zoom-out"



The view zooms back out one level

FIG. 13

DIFFERENT TYPES OF SEGMENTATION



EQUAL AREA, NON-OVERLAPPING SEGMENTATION

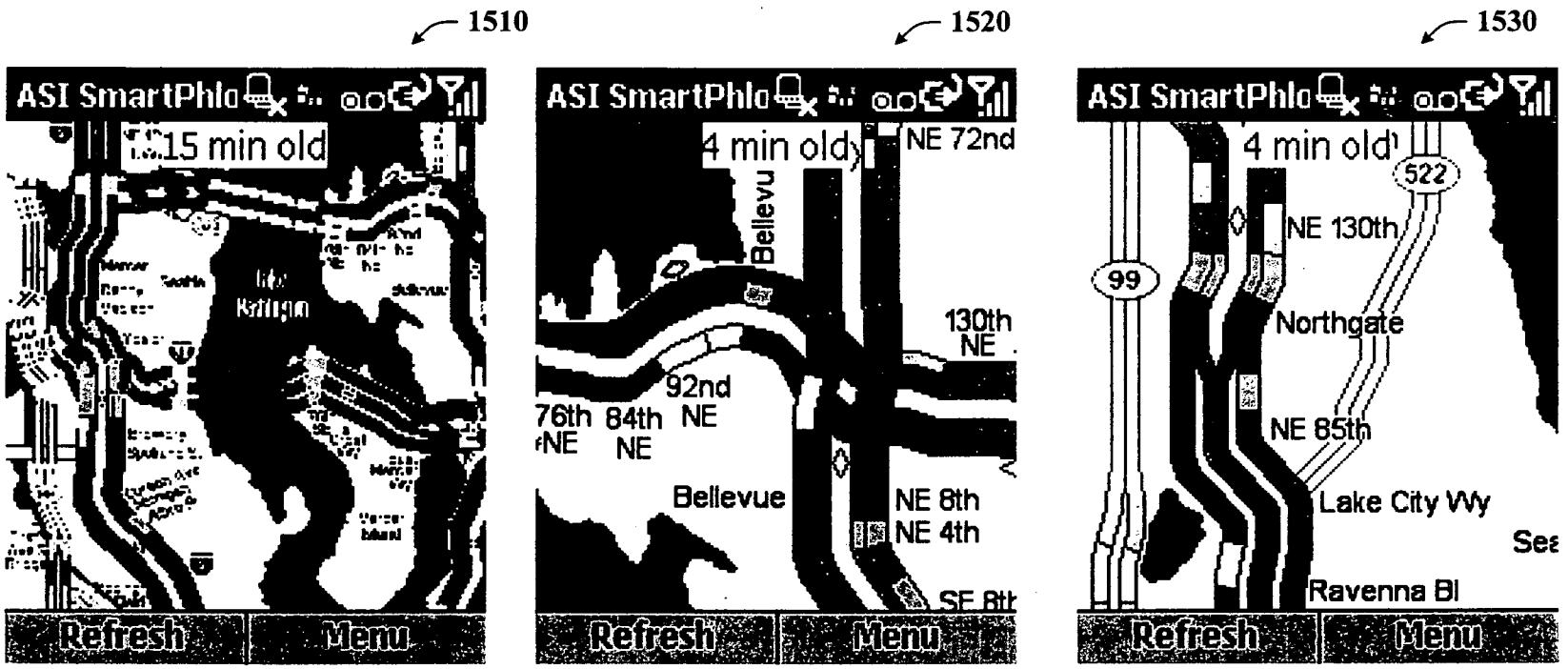
EQUAL AREA, OVERLAPPING SEGMENTATION (ADJOINING AREAS HAVE OVERLAP WHEN ZOOMED IN)

EQUAL AREA POSITIONED TO CORRESPOND WITH HIGHEST DENSITY AREAS OF DATA-SET

NON-EQUAL AREA, POSITIONED AND SIZED TO MORE CLOSELY CORRESPOND WITH HIGHEST DENSITY AREAS OF DATA-SET

NON-EQUAL AREA, AND ARBITRARY ASPECT RATIO REGIONS THAT ADAPT TO UNDERLYING DATA AND USAGE

FIG. 14



ZOOMED OUT VIEW OF THE TRAFFIC MAP

TWO DIFFERENT VIEW SECTORS (AT THE SAME ZOOM LEVEL)

FIG. 15

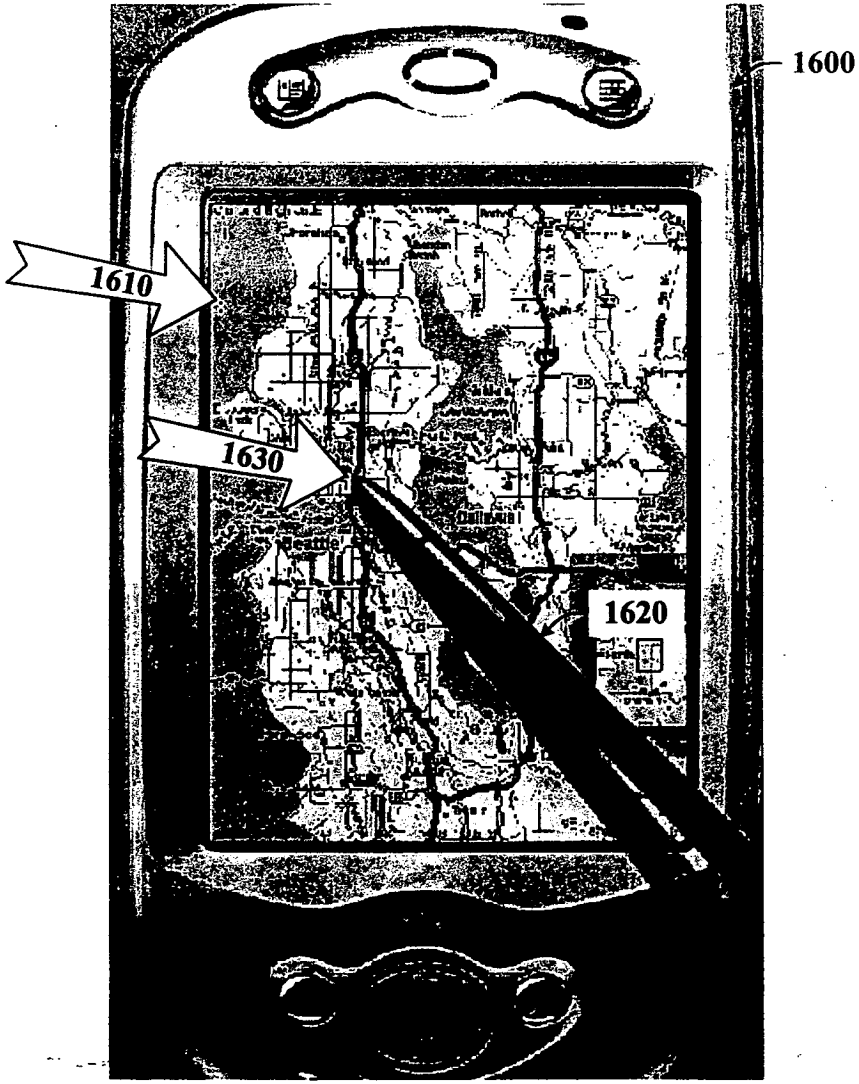


FIG. 16

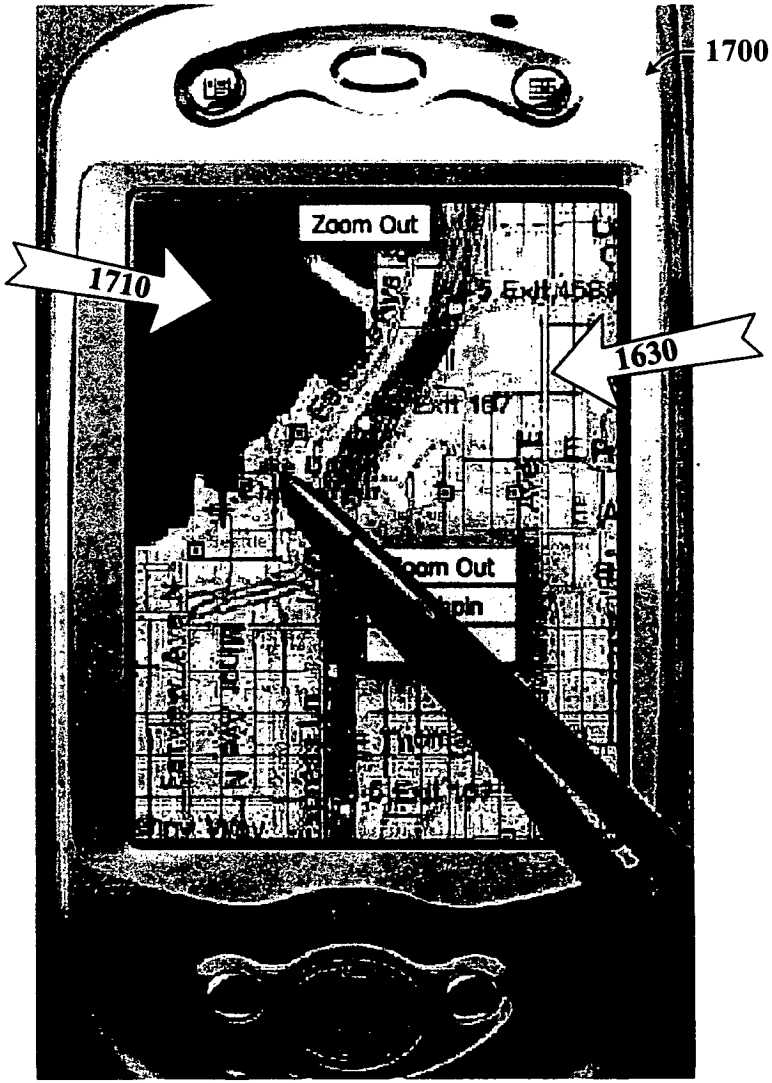


FIG. 17

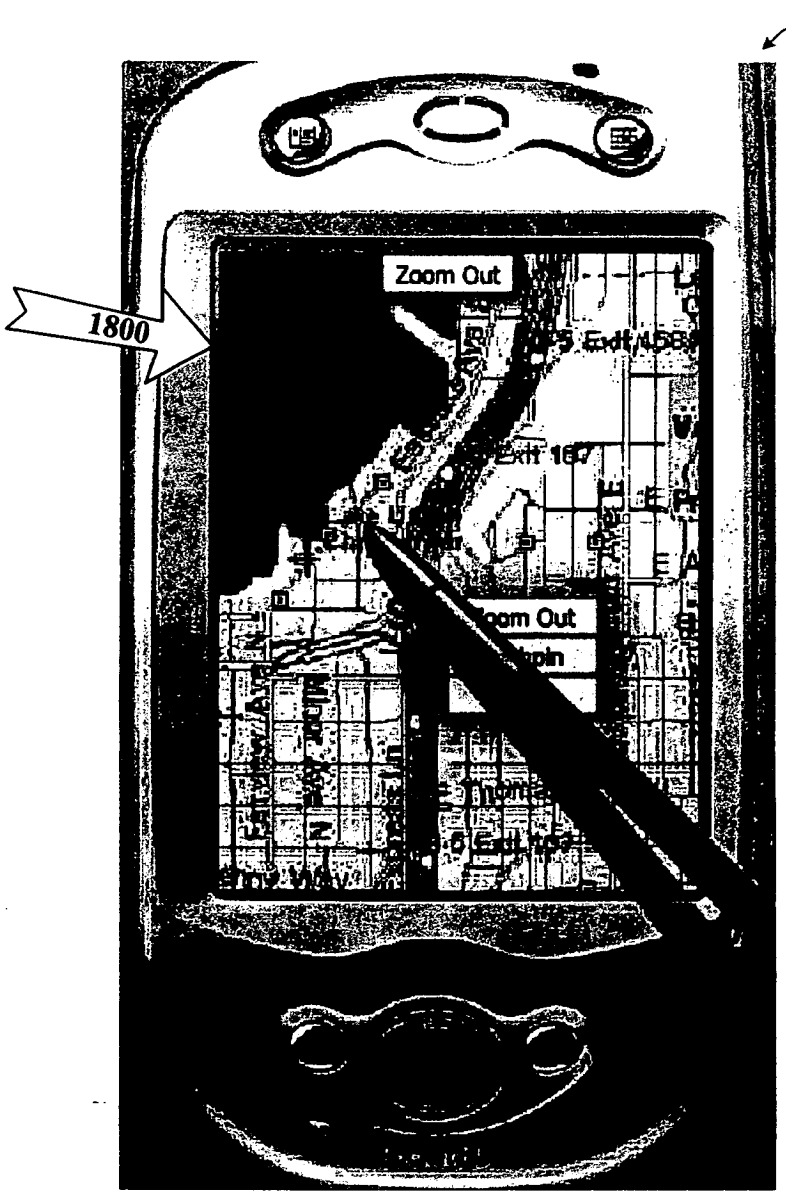


FIG. 18

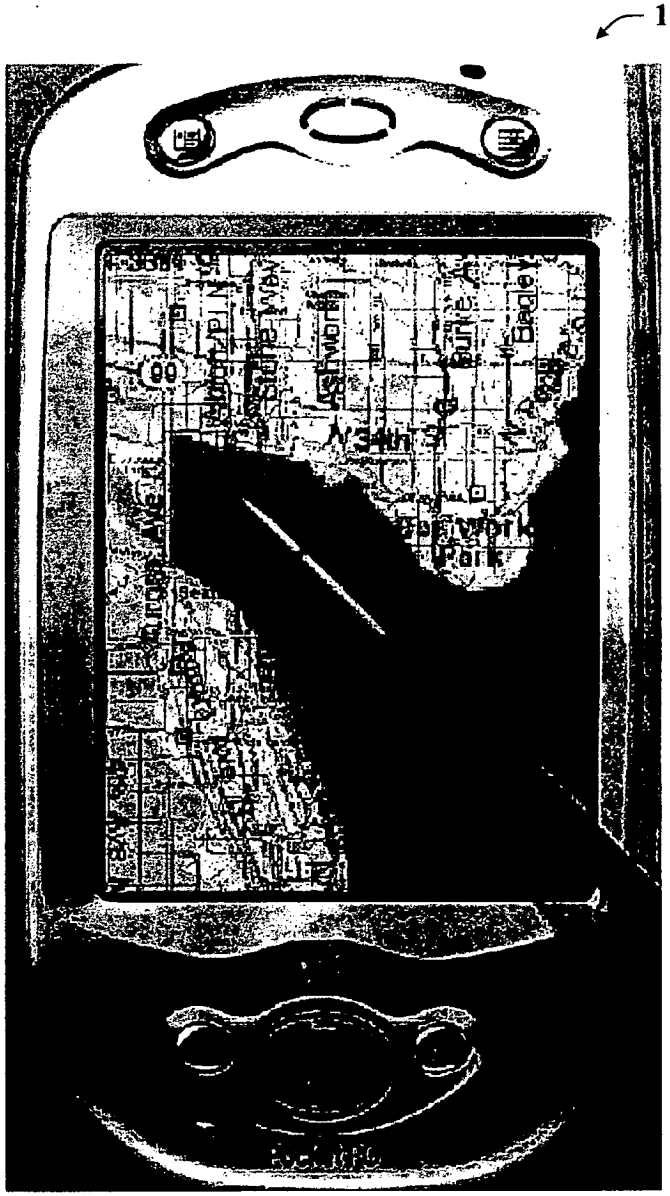


FIG. 19

FIG. 20

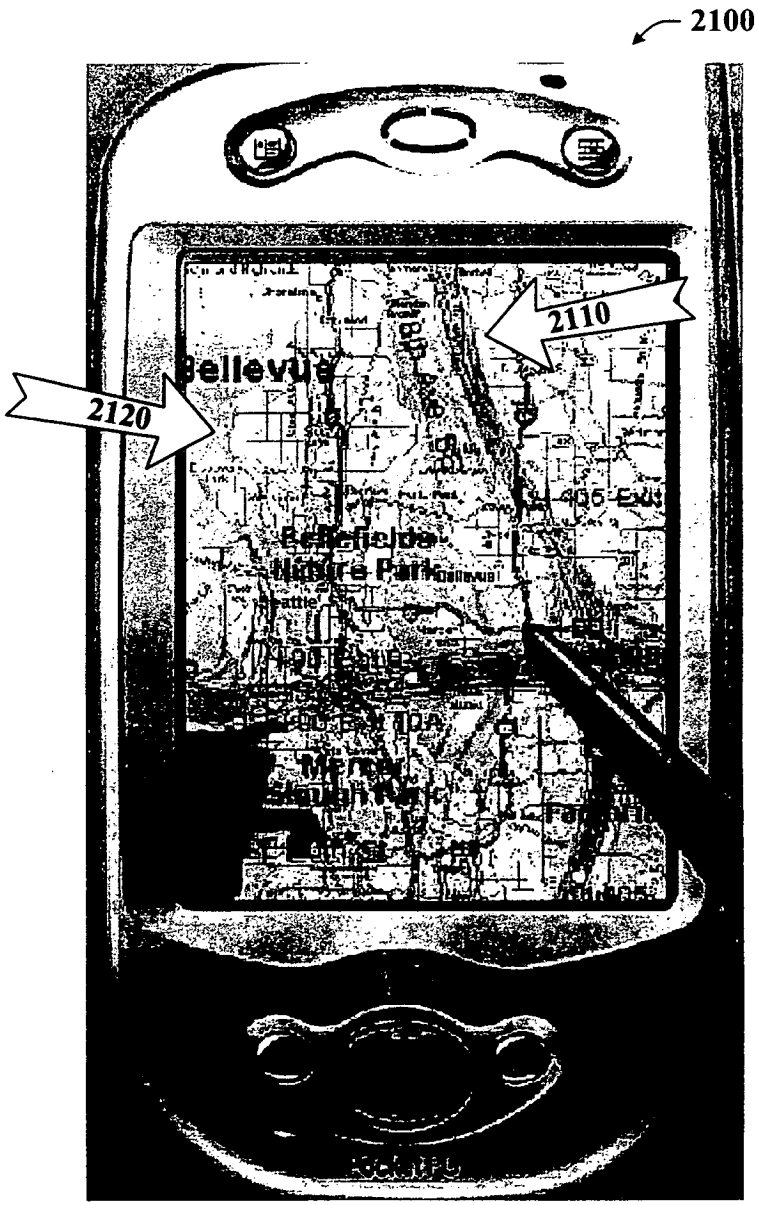


FIG. 21

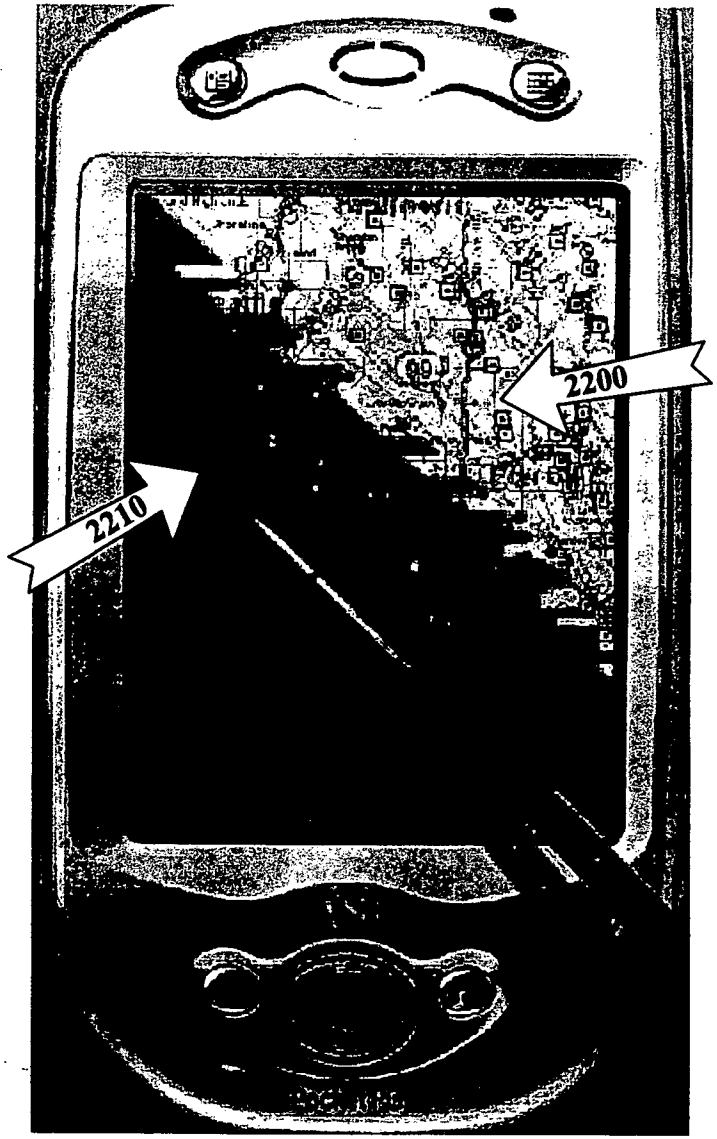


FIG. 22

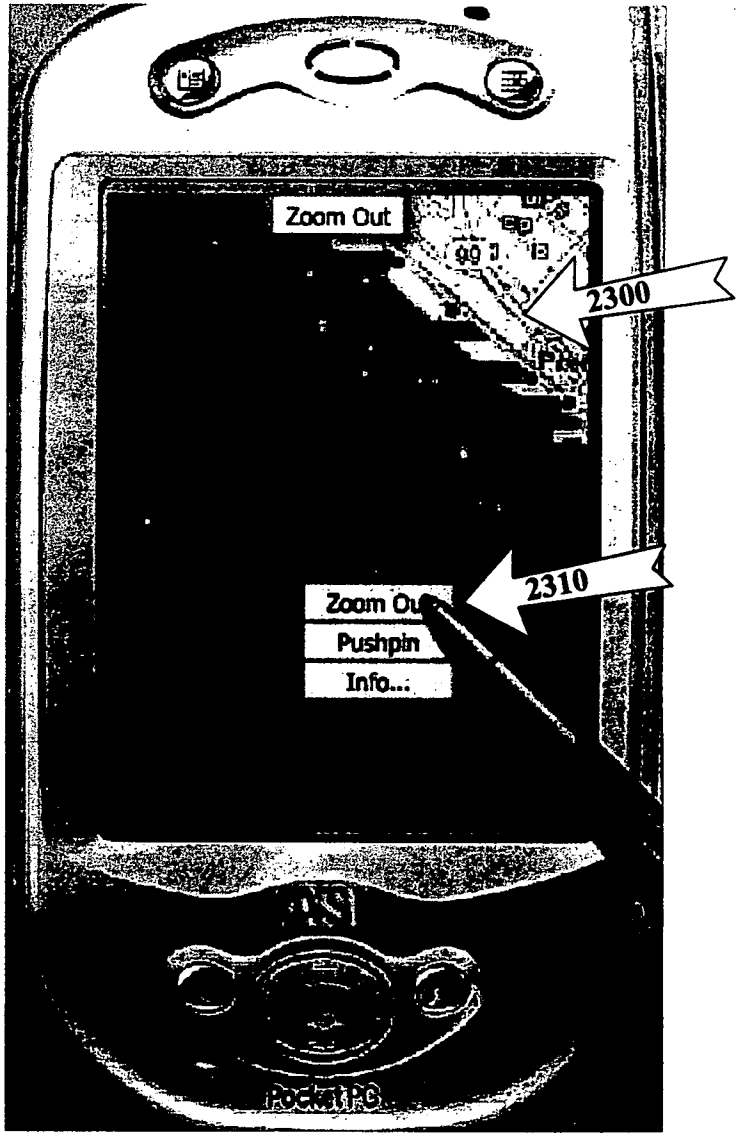


FIG. 23

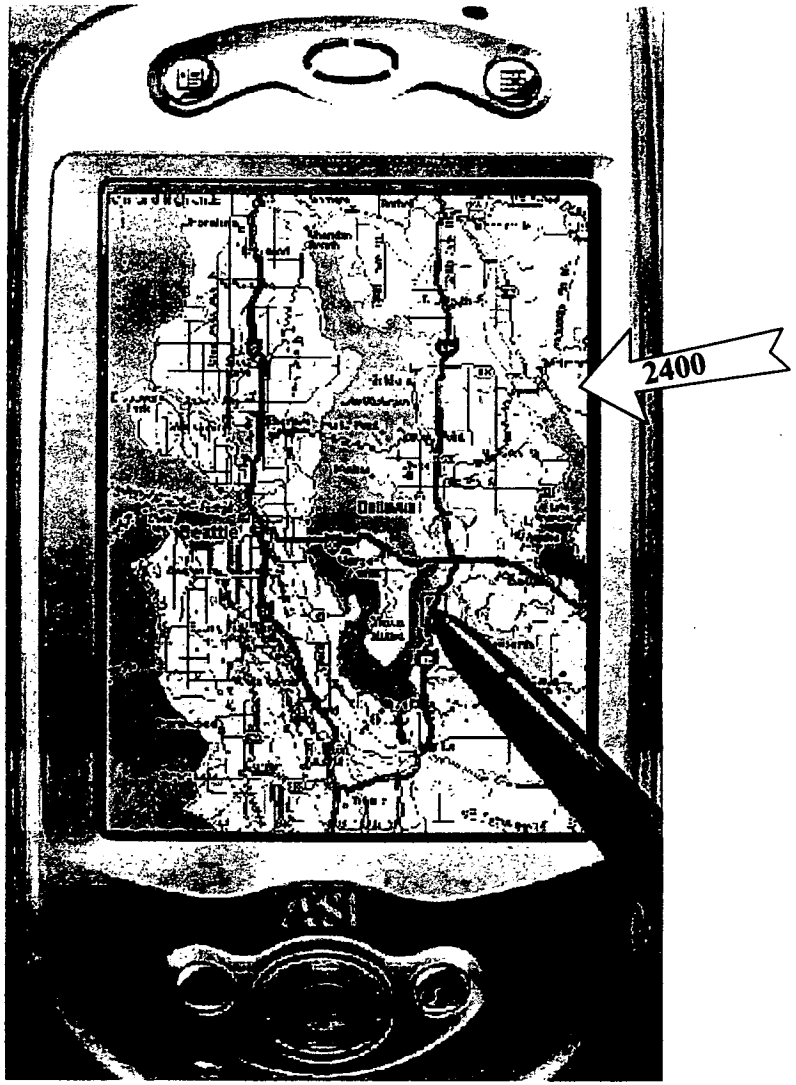


FIG. 24

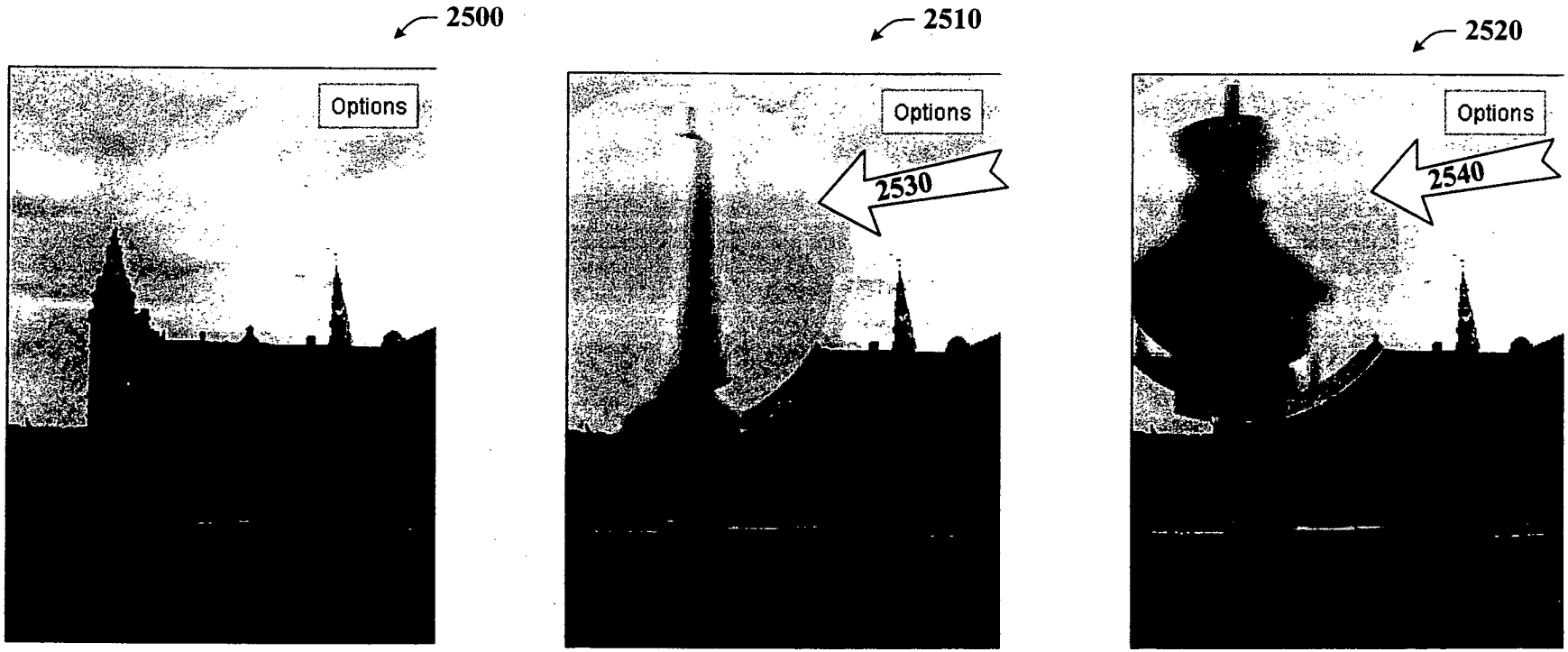
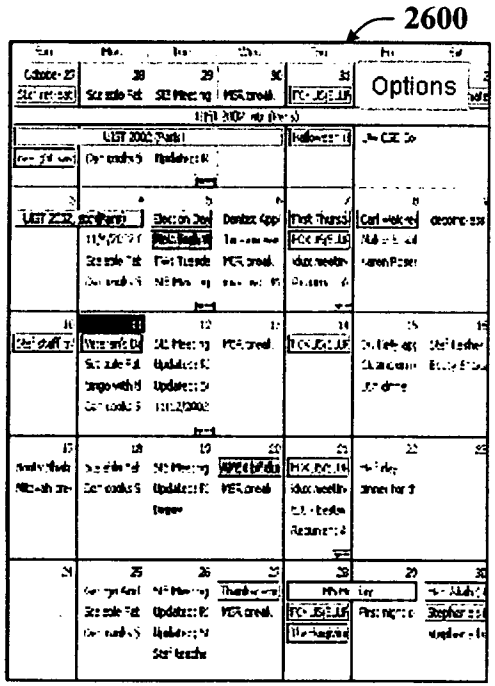


FIG. 25


2600
Options

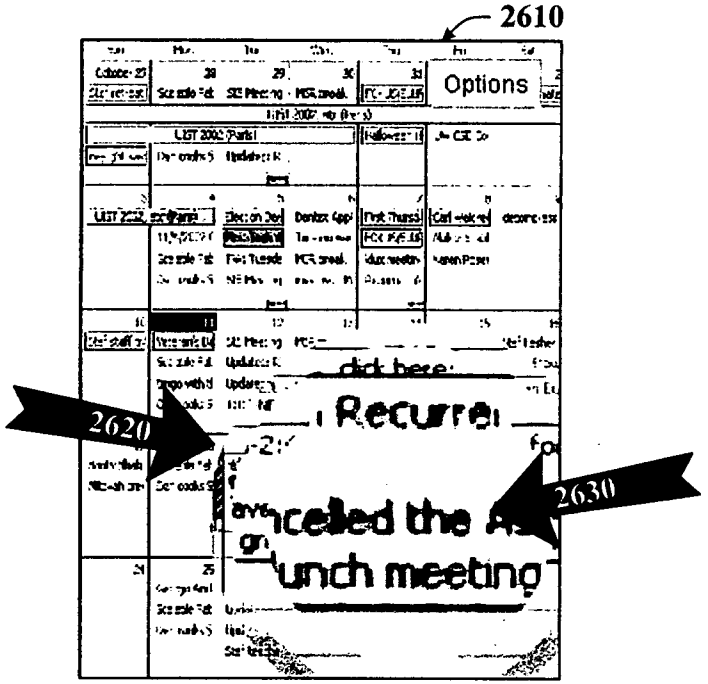

2610
Options
2620
2630
click here
Recurre
unch meeting

FIG. 26

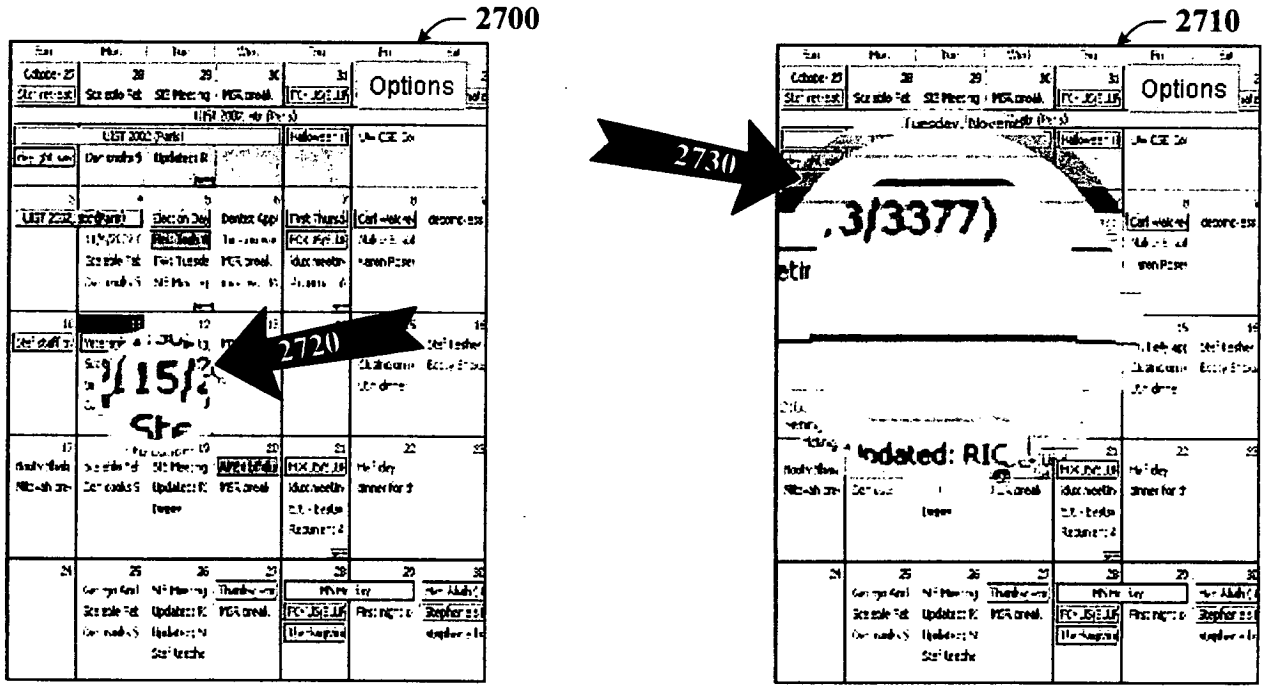


FIG. 27

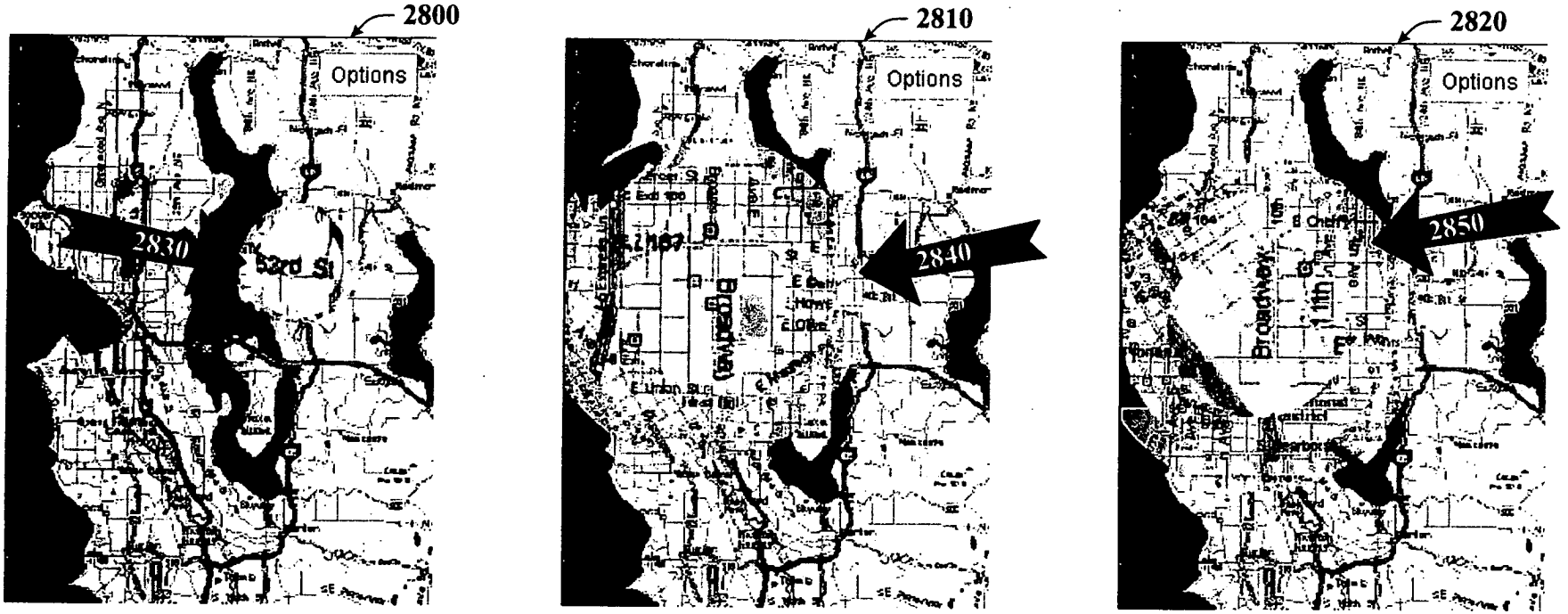

2800
Options
2830
52nd St
2810
Options
2840
Broadway
2820
Options
2850
Broadway
11th

FIG. 28

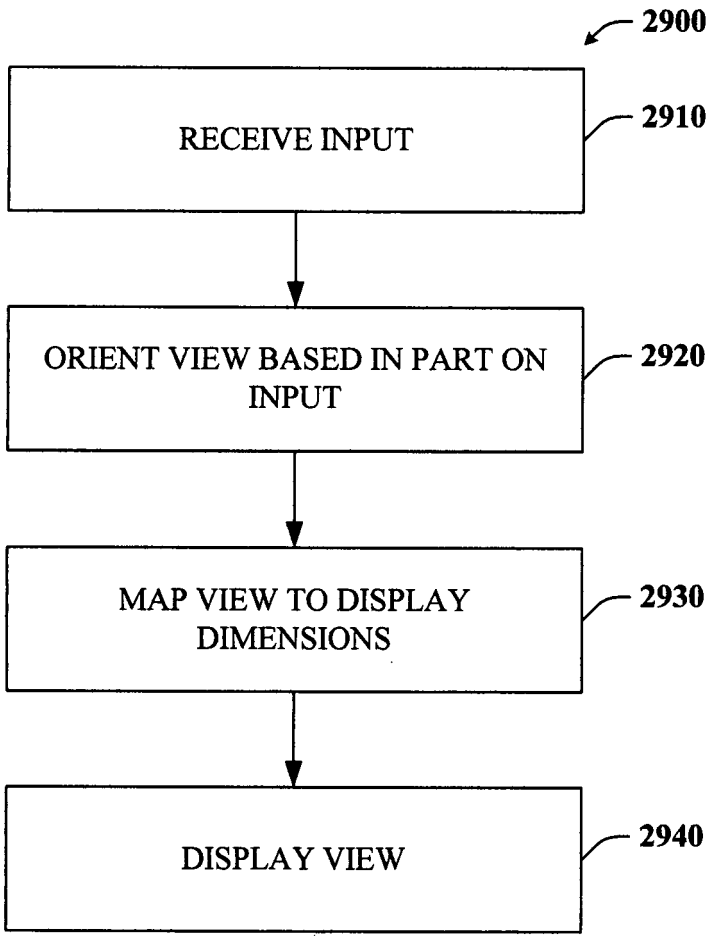

2900
RECEIVE INPUT
2910
ORIENT VIEW BASED IN PART ON INPUT
2920
MAP VIEW TO DISPLAY DIMENSIONS
2930
DISPLAY VIEW
2940

FIG. 29

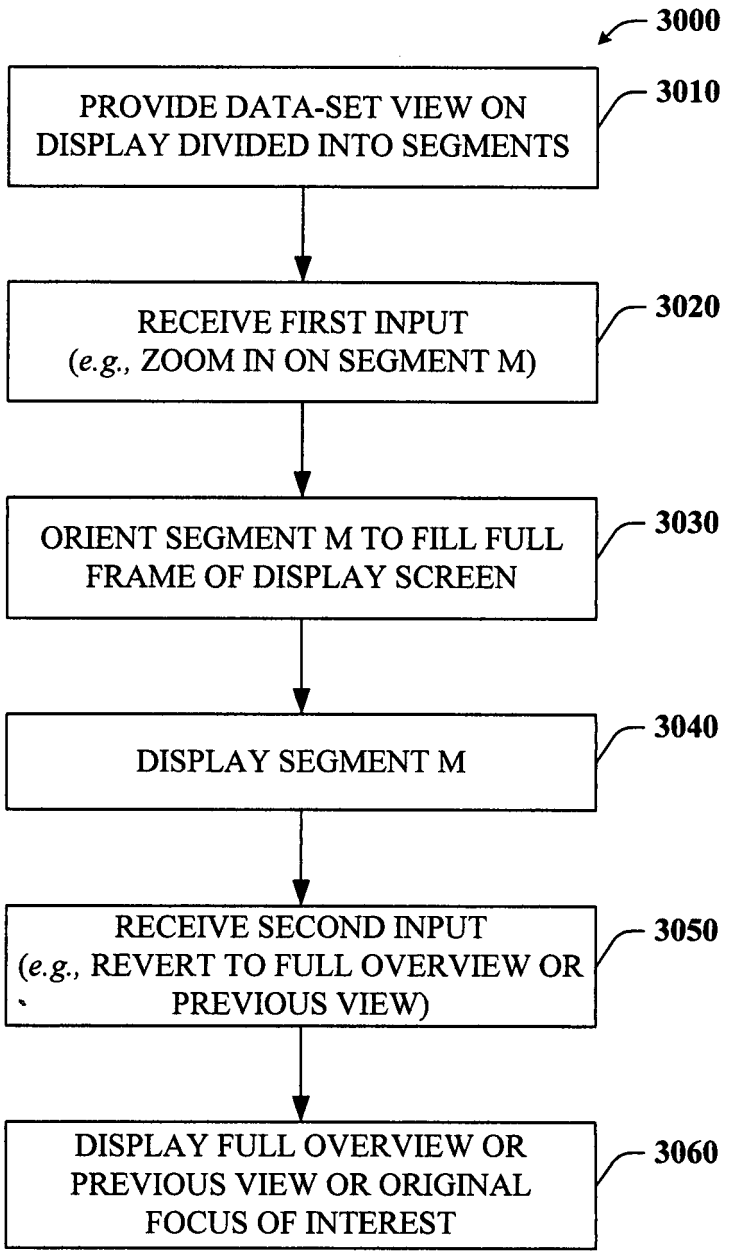

3000
PROVIDE DATA-SET VIEW ON DISPLAY DIVIDED INTO SEGMENTS
3010
RECEIVE FIRST INPUT (e.g., ZOOM IN ON SEGMENT M)
3020
ORIENT SEGMENT M TO FILL FULL FRAME OF DISPLAY SCREEN
3030
DISPLAY SEGMENT M
3040
RECEIVE SECOND INPUT (e.g., REVERT TO FULL OVERVIEW OR PREVIOUS VIEW)
3050
DISPLAY FULL OVERVIEW OR PREVIOUS VIEW OR ORIGINAL FOCUS OF INTEREST
3060

FIG. 30

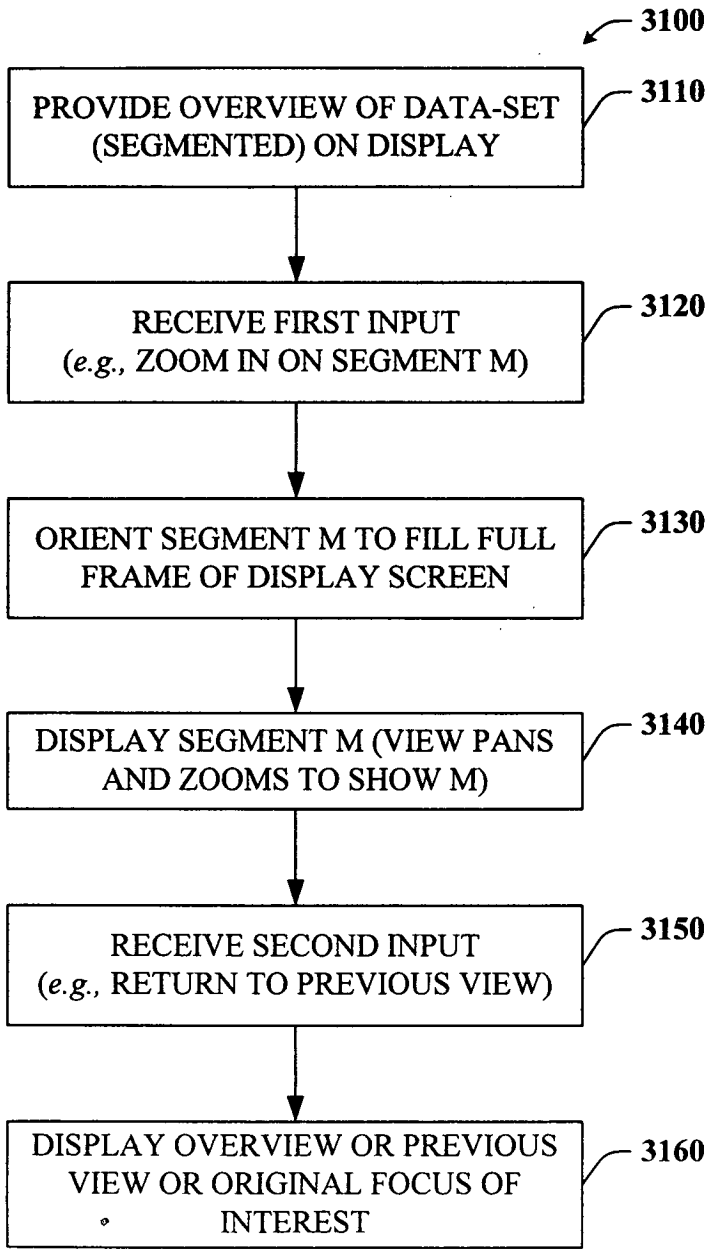

3100
PROVIDE OVERVIEW OF DATA-SET (SEGMENTED) ON DISPLAY
3110
RECEIVE FIRST INPUT (e.g., ZOOM IN ON SEGMENT M)
3120
ORIENT SEGMENT M TO FILL FULL FRAME OF DISPLAY SCREEN
3130
DISPLAY SEGMENT M (VIEW PANS AND ZOOMS TO SHOW M)
3140
RECEIVE SECOND INPUT (e.g., RETURN TO PREVIOUS VIEW)
3150
DISPLAY OVERVIEW OR PREVIOUS VIEW OR ORIGINAL FOCUS OF INTEREST
3160

FIG. 31

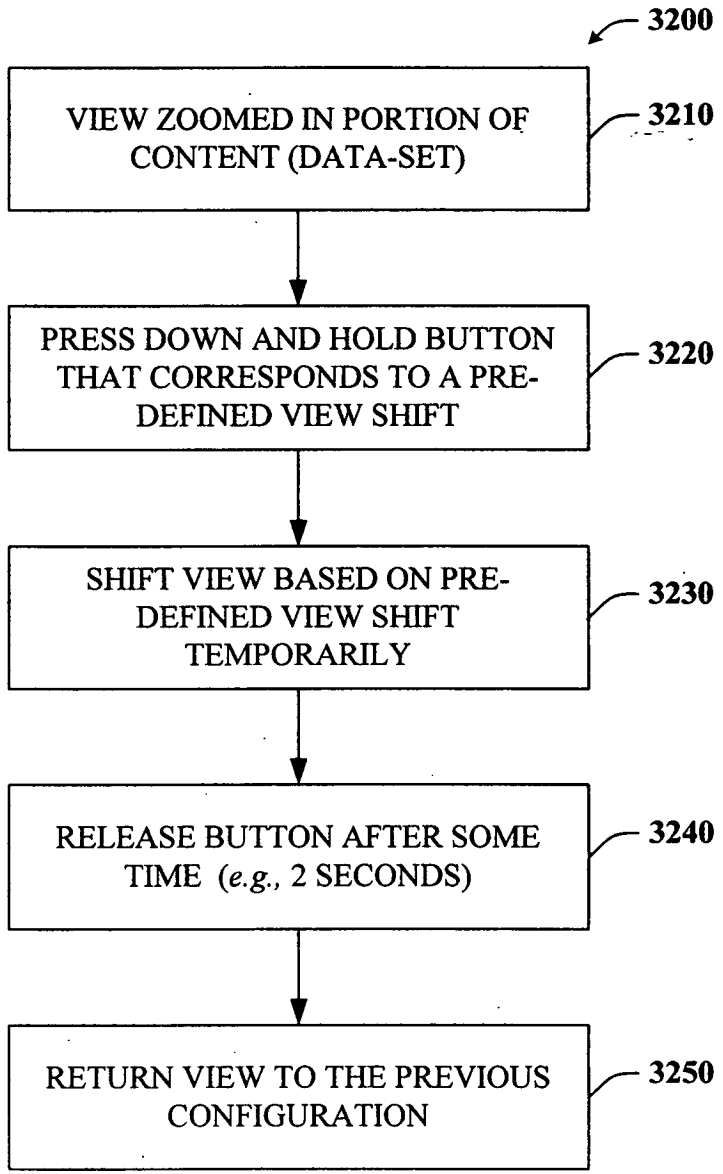

3200
VIEW ZOOMED IN PORTION OF CONTENT (DATA-SET)
3210
PRESS DOWN AND HOLD BUTTON THAT CORRESPONDS TO A PRE-DEFINED VIEW SHIFT
3220
SHIFT VIEW BASED ON PRE-DEFINED VIEW SHIFT TEMPORARILY
3230
RELEASE BUTTON AFTER SOME TIME (e.g., 2 SECONDS)
3240
RETURN VIEW TO THE PREVIOUS CONFIGURATION
3250

FIG. 32

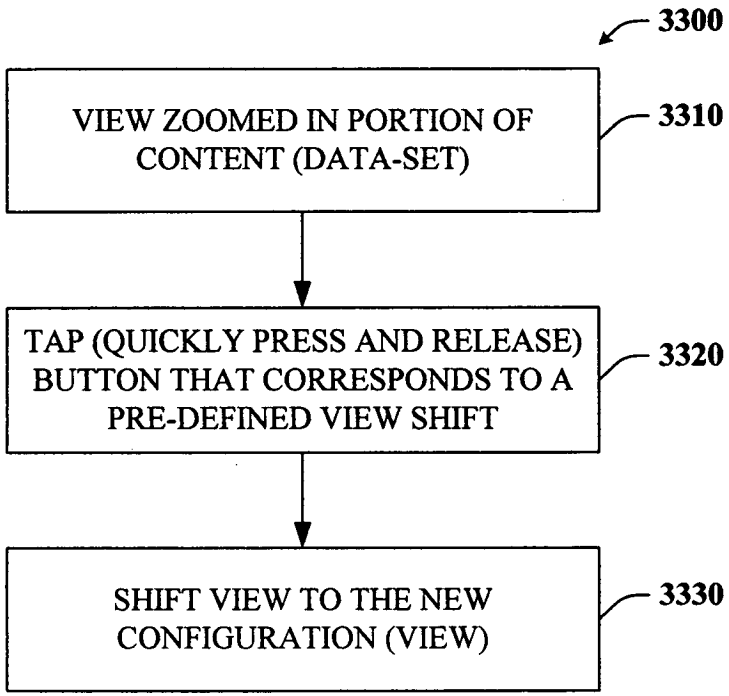

3300
VIEW ZOOMED IN PORTION OF CONTENT (DATA-SET)
3310
TAP (QUICKLY PRESS AND RELEASE) BUTTON THAT CORRESPONDS TO A PRE-DEFINED VIEW SHIFT
3320
SHIFT VIEW TO THE NEW CONFIGURATION (VIEW)
3330

FIG. 33

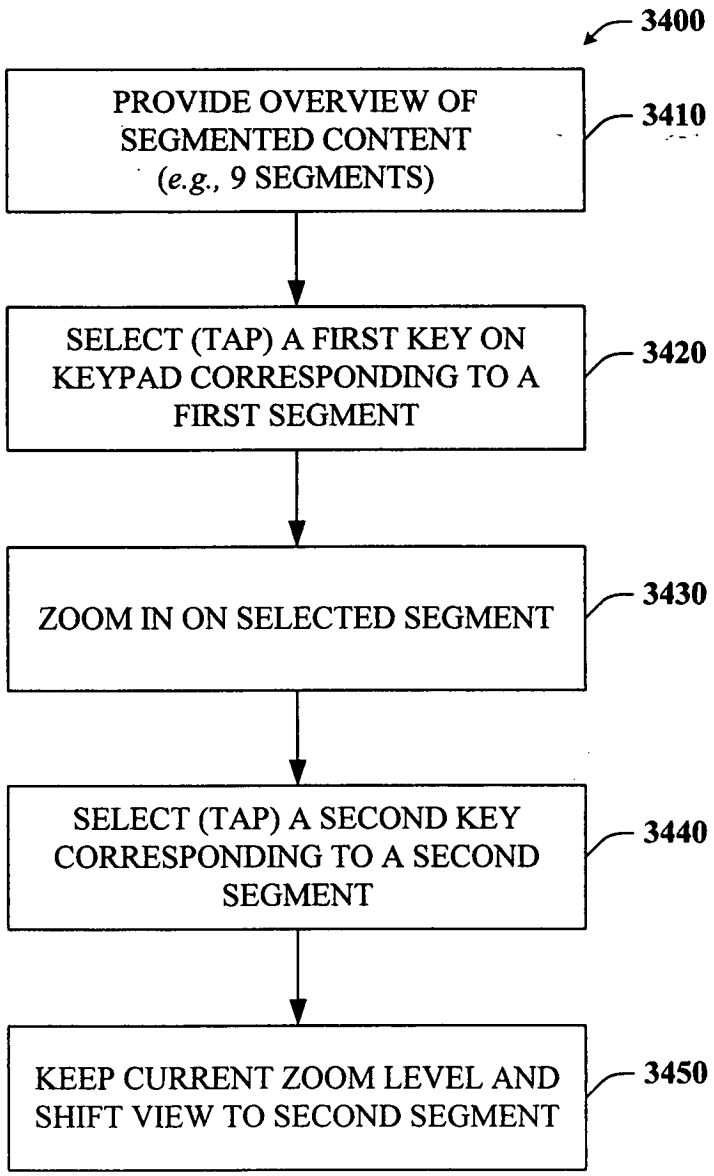

3400
PROVIDE OVERVIEW OF SEGMENTED CONTENT (e.g., 9 SEGMENTS)
3410
SELECT (TAP) A FIRST KEY ON KEYPAD CORRESPONDING TO A FIRST SEGMENT
3420
ZOOM IN ON SELECTED SEGMENT
3430
SELECT (TAP) A SECOND KEY CORRESPONDING TO A SECOND SEGMENT
3440
KEEP CURRENT ZOOM LEVEL AND SHIFT VIEW TO SECOND SEGMENT
3450

FIG. 34

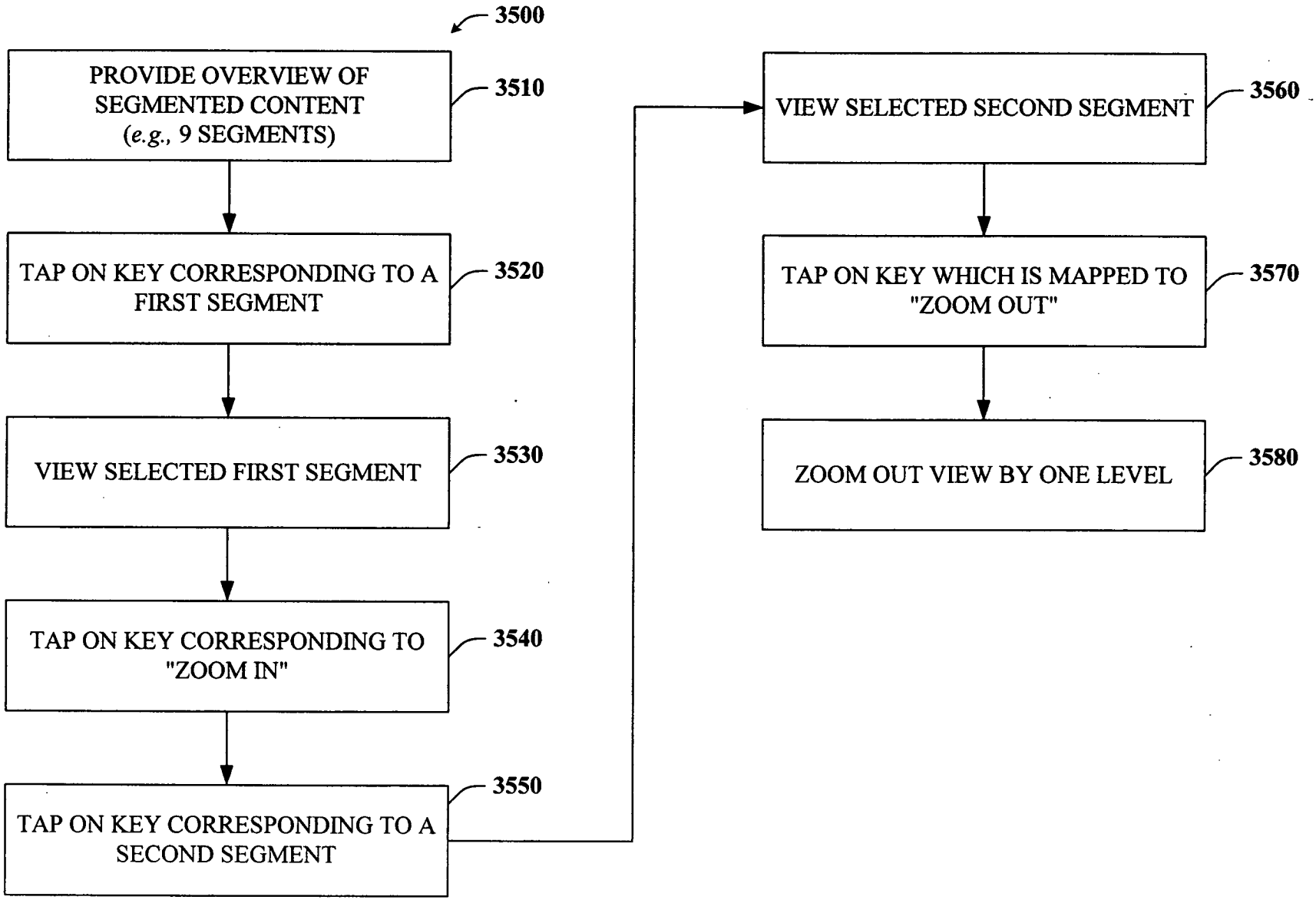

3500
PROVIDE OVERVIEW OF SEGMENTED CONTENT (e.g., 9 SEGMENTS)
3510
TAP ON KEY CORRESPONDING TO A FIRST SEGMENT
3520
VIEW SELECTED FIRST SEGMENT
3530
TAP ON KEY CORRESPONDING TO "ZOOM IN"
3540
TAP ON KEY CORRESPONDING TO A SECOND SEGMENT
3550
VIEW SELECTED SECOND SEGMENT
3560
TAP ON KEY WHICH IS MAPPED TO "ZOOM OUT"
3570
ZOOM OUT VIEW BY ONE LEVEL
3580

FIG. 35

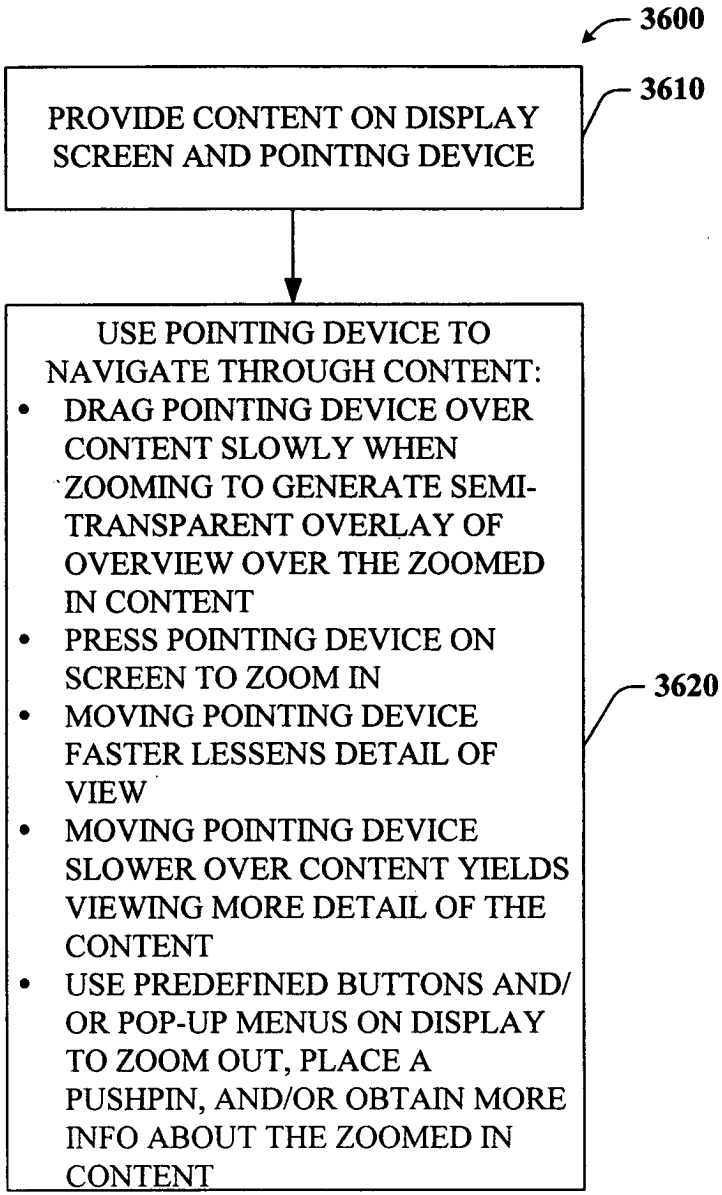

3600
PROVIDE CONTENT ON DISPLAY SCREEN AND POINTING DEVICE
3610
USE POINTING DEVICE TO NAVIGATE THROUGH CONTENT:
• DRAG POINTING DEVICE OVER CONTENT SLOWLY WHEN ZOOMING TO GENERATE SEMI-TRANSPARENT OVERLAY OF OVERVIEW OVER THE ZOOMED IN CONTENT
• PRESS POINTING DEVICE ON SCREEN TO ZOOM IN
• MOVING POINTING DEVICE FASTER LESSENS DETAIL OF VIEW
• MOVING POINTING DEVICE SLOWER OVER CONTENT YIELDS VIEWING MORE DETAIL OF THE CONTENT
• USE PREDEFINED BUTTONS AND/OR POP-UP MENUS ON DISPLAY TO ZOOM OUT, PLACE A PUSHPIN, AND/OR OBTAIN MORE INFO ABOUT THE ZOOMED IN CONTENT
3620

FIG. 36

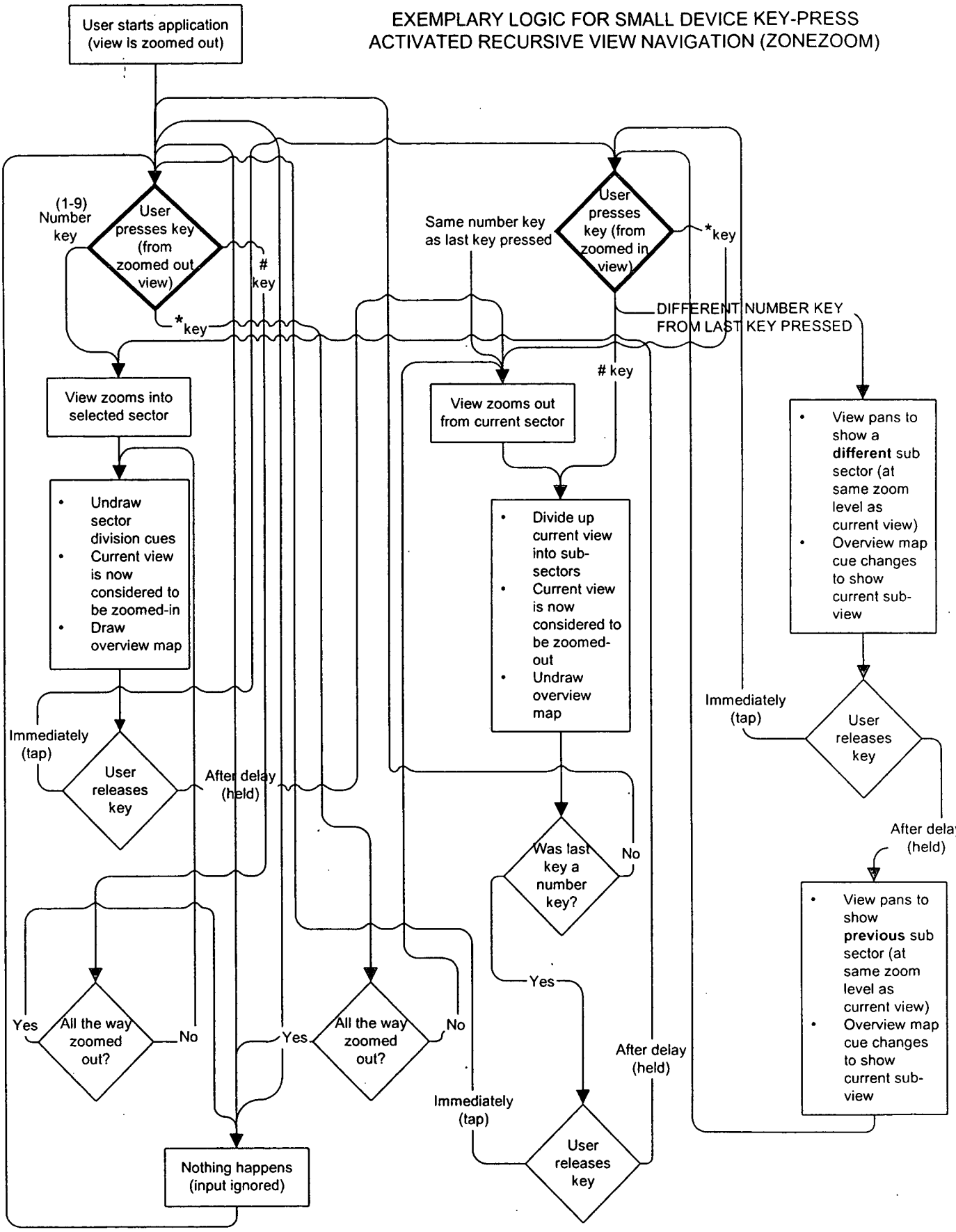

EXEMPLARY LOGIC FOR SMALL DEVICE KEY-PRESS ACTIVATED RECURSIVE VIEW NAVIGATION (ZONEZOOM)
User starts application (view is zoomed out)
User presses key (from zoomed out view)
(1-9) Number key
key
*key
View zooms into selected sector
Undraw sector division cues
Current view is now considered to be zoomed-in
Draw overview map
Immediately (tap)
User releases key
After delay (held)
All the way zoomed out?
Yes
No
Nothing happens (input ignored)
User presses key (from zoomed in view)
Same number key as last key pressed
*key
DIFFERENT NUMBER KEY FROM LAST KEY PRESSED
key
View zooms out from current sector
Divide up current view into sub-sectors
Current view is now considered to be zoomed-out
Undraw overview map
Was last key a number key?
No
Yes
All the way zoomed out?
Yes
No
Immediately (tap)
User releases key
After delay (held)
View pans to show a different sub sector (at same zoom level as current view)
Overview map cue changes to show current sub-view
Immediately (tap)
User releases key
After delay (held)
View pans to show previous sub sector (at same zoom level as current view)
Overview map cue changes to show current sub-view

FIG. 37

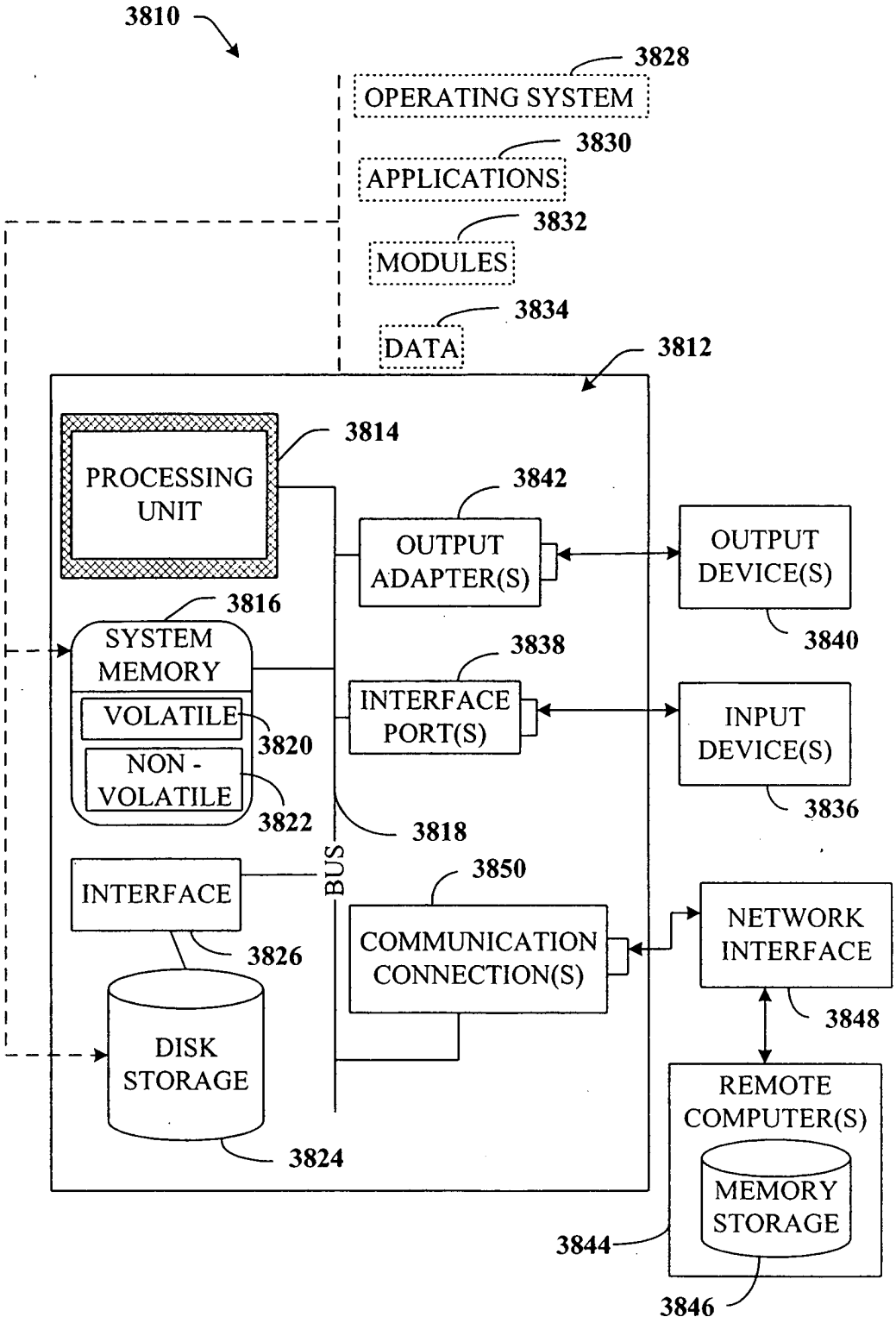

3810
3828
OPERATING SYSTEM
3830
APPLICATIONS
3832
MODULES
3834
DATA
3812
3814
PROCESSING UNIT
3842
OUTPUT ADAPTER(S)
OUTPUT DEVICE(S)
3840
3816
SYSTEM MEMORY
VOLATILE
3820
NON - VOLATILE
3822
3838
INTERFACE PORT(S)
INPUT DEVICE(S)
3836
3818
BUS
INTERFACE
3826
3850
COMMUNICATION CONNECTION(S)
NETWORK INTERFACE
3848
DISK STORAGE
3824
REMOTE COMPUTER(S)
MEMORY STORAGE
3844
3846

FIG. 38